PTO/SB/122 (04-15)
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# CHANGE OF CORRESPONDENCE ADDRESS
***Application***

Address to:
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

| | |
|---|---|
| Application Number | 12/935,040 |
| Filing Date | 2010-09-28 |
| First Named Inventor | Mohamed Boucadair |
| Art Unit | 2472 |
| Examiner Name | BELUR, DEEPA |
| Attorney Docket Number | P3594US |

Please change the Correspondence Address for the above-identified patent application to:

☒ The address associated with Customer Number: 175872

***OR***

☐ Firm or Individual Name

Address

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Country

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I am the:

☐ Applicant/Inventor

☐ Assignee of record of the entire interest.
Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

☒ Attorney or agent of record. Registration Number 53563.

☐ Registered practitioner named in the application transmittal letter in an application without an executed oath or declaration. See 37 CFR 1.33(a)(1). Registration Number_____.

| | |
|---|---|
| Signature | /David Wade Schnell/ |
| Typed or Printed Name | David Wade Schnell |
| Date | June 14, 2021 |
| Telephone | 4809949888 |

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☑ *Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
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# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 42972620 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | David Wade Schnell/Acacia IP |
| **Filer Authorized By:** | David Wade Schnell |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 14-JUN-2021 |
| **Filing Date:** | 28-SEP-2010 |
| **Time Stamp:** | 07:08:45 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Change of Address | Change_of_Address_12935040.pdf | 98091<br>5e5ee6cad0b4b55eba0571fd829f1c4af3fccb01 | no | 2 |

**Warnings:**

| Information: | |
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| Total Files Size (in bytes): | 98091 |

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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| APPLICATION NO. | ISSUE DATE | PATENT NO. | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 04/08/2014 | 8693369 | P3594US | 1314 |

8968 7590 03/19/2014

DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

# ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 385 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Mohamed Boucadair, Rennes, FRANCE;

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OK TO ENTER: /D.B./

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: 2472

Application No. 12/935,040

Examiner: Deepa Belur

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**AMENDMENT UNDER RULE 312**

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

This amendment is responsive to the Notice of Allowance mailed on November 21, 2013.

**Amendments to the Specification** begin on page 2 of this paper.

**Remarks** begin on page 3 of this paper.

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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8968 7590 11/21/2013
DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

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| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

TITLE OF INVENTION: METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $960 | $0 | $0 | $960 | 02/21/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| BELUR, DEEPA | 2472 | 370-254000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Drinker Biddle & Reath LLP
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Orange

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Paris, France

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ☒ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

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- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 07-0181 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

| | |
|---|---|
| ❑ Applicant certifying micro entity status. See 37 CFR 1.29 | NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. |
| ❑ Applicant asserting small entity status. See 37 CFR 1.27 | NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status. |
| ❑ Applicant changing to regular undiscounted fee status. | NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable. |

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature / brian c. rupp / Date 13 February 2014

Typed or printed name Brian C. Rupp Registration No. 35,665

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**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Application No. 12/935,040

Filed: September 28, 2010

Art Unit: 2472

Examiner: Deepa Belur

Date of Mailing of "Notice of Allowance and Fee(s) Due": November 21, 2013

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**TRANSMITTAL OF PAYMENT OF FEE(S) (37 CFR 1.311)**

Mail Stop Issue Fee
Commissioner for Patents
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Alexandria, Virginia 22313-1450

Dear Madam:

Applicant hereby pays the issue fee for the above-identified patent application.

Application Status

This application is on behalf of:

☒ other than a small entity or ☐ a small entity.

☐ The verified statement ☐ is attached or ☐ was filed on .

Assignment of Application

☒ This application is assigned to ORANGE of Paris, France, and the assignment has been previously submitted to the Patent and Trademark Office.

☐ This application is NOT assigned.

☐ Assignment being submitted under separate cover. Assignment should be directed to Mail Stop ASSIGNMENT.

Fees

☒ Pursuant to 35 CFR 1.18(a), (b) and (c), the issue fee due in this application is $960.00.

☒ The publication fee due in this application is $0.00

☐ Advance Order - _____ # of Copies

Payment of Fees

☐ A check in the amount of $

☒ Charge Deposit Account No. 07-0181 for any fee deficiency.

☒ Charge Deposit Account No. 07-0181 in the sum of $960.00.

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
One of Attorneys for Applicant(s)
DRINKER BIDDLE & REATH LLP
191 N. Wacker Drive, Suite 3700
Chicago, IL 60606-1698
(312) 569-1000 (telephone)
(312) 569-3000 (facsimile)
Customer No.: 08968

Date: February 13, 2014

CH01/ 26323869.1

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | 12935040 |
| **Filing Date:** | 28-Sep-2010 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Attorney Docket Number:** | P3594US |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| **Pages:** | | | | |
| **Claims:** | | | | |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| Utility Appl Issue Fee | 1501 | 1 | 960 | 960 |
| Publ. Fee- Early, Voluntary, or Normal | 1504 | 1 | 0 | 0 |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | | **Total in USD ($)** | **960** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 18196337 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 13-FEB-2014 |
| **Filing Date:** | 28-SEP-2010 |
| **Time Stamp:** | 12:49:42 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $960 |
| RAM confirmation Number | 11268 |
| Deposit Account | 070181 |
| Authorized User | |

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Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Issue Fee Payment (PTO-85B) | P3594US_Issue_Fee.pdf | 1046828<br>8b09abc3130faa31d478170ff32aeac4bc5f4909 | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Transmittal Letter | P3594US_Issue_Fee_Transmittal.pdf | 55173<br>0c6977d3448036aba7f56a380d16a6a597a2be0e | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 3 | Fee Worksheet (SB06) | fee-info.pdf | 32344<br>1af02777133c8972e017abdde38cc0c26f5e8c0a | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: 2472

Application No. 12/935,040

Examiner: Deepa Belur

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**AMENDMENT UNDER RULE 312**

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

This amendment is responsive to the Notice of Allowance mailed on November 21, 2013.

**Amendments to the Specification** begin on page 2 of this paper.

**Remarks** begin on page 3 of this paper.

**Amendment to the Specification**

Please amend the paragraph at page 14 at line 34 to page 15 at line 13 of the application with the following amended paragraph:

This routing method is described below with reference to Figure 4. On reception of a data packet PT containing a destination public address @PUB and a destination port number P2, the routing method of the invention executes a step E1 of determining a port mask defining a range of port numbers to which the port number P2 belongs. The port masks assigned to the pieces of terminal equipment of the network may advantageously be stored in a database BD1. In a step E2, this port mask MP is used to select a destination equipment of the packet PT from a plurality of pieces of terminal equipment having the same public address [[P2]] @PUB and to identify it by means of its routing identifier IDR. The packet is then routed in step E3 to the destination equipment selected on the basis of its routing identifier IDR. If the routing device AN 300 has no entry in its routing tables, the packet in question is eliminated.



Juniper Exhibit 1002, page 16

## REMARKS

The following remarks are responsive to the Notice of Allowance mailed on November 21, 2013.

**Amendment to the Specification**

Applicant herein amends the paragraph at page 14 at line 34 to page 15 at line 13 of the specification to correct a typographical error. Specifically, the paragraph at page 15 at lines 5–9 has been amended to state: "In a step E2, this port mask MP is used to select a destination equipment of the packet PT from a plurality of pieces of terminal equipment having the same public address [[P2]] @PUB and to identify it by means of its routing identifier IDR." This amendment is fully supported by the application as filed. As disclosed in the application, "P2" refers to a "port number" and "@PUB" refers to a "public address" (e.g., page 14 at line 34 states a "destination public address @PUB" and page 14 at line 35 states a "destination port number P2"). No new matter has been added. Accordingly, Applicant respectfully requests that the amendment to the specification be entered.

**Conclusion**

This application is believed to be in condition for allowance and early favorable action is requested. The Examiner is requested to call the undersigned attorney if that would be helpful in resolving any matters that might remain.

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
Lynn Q. Peng, Reg. No. 69,755
DRINKER BIDDLE & REATH LLP
191 N. Wacker Drive, Suite 3700
Chicago, Illinois 60606-1698
(312) 569-1000 (telephone)
(312) 569-3000 (facsimile)
Customer No. 08968

Date: January 15, 2014

CH01/ 26305457.1

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 17918539 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 15-JAN-2014 |
| **Filing Date:** | 28-SEP-2010 |
| **Time Stamp:** | 13:26:13 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P3594US_Amendment_Under_Rule_312.pdf | 66139<br>e1b6d4c7ea017562aa8b0e38a667b6d30661778d | yes | 3 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Amendment after Notice of Allowance (Rule 312) | 1 | 1 |
| | Specification | 2 | 2 |
| | Applicant Arguments/Remarks Made in an Amendment | 3 | 3 |
| **Warnings:** | | | |
| **Information:** | | | |
| | **Total Files Size (in bytes):** | 66139 | |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**
**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**
**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# NOTICE OF ALLOWANCE AND FEE(S) DUE

8968 7590 11/21/2013

DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

| EXAMINER |
|---|
| BELUR, DEEPA |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2472 | |

DATE MAILED: 11/21/2013

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

TITLE OF INVENTION: METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1780 | $300 | $0 | $2080 | 02/21/2014 |

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

**HOW TO REPLY TO THIS NOTICE:**

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

## PART B - FEE(S) TRANSMITTAL

**Complete and send this form, together with applicable fee(s), to: Mail** **Mail Stop ISSUE FEE**
**Commissioner for Patents**
**P.O. Box 1450**
**Alexandria, Virginia 22313-1450**
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

8968 7590 11/21/2013
DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

| |
|---|
| (Depositor's name) |
| (Signature) |
| (Date) |

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

TITLE OF INVENTION: METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

| APPLN. TYPE | ENTITY STATUS | ISSUE FEE DUE | PUBLICATION FEE DUE | PREV. PAID ISSUE FEE | TOTAL FEE(S) DUE | DATE DUE |
|---|---|---|---|---|---|---|
| nonprovisional | UNDISCOUNTED | $1780 | $300 | $0 | $2080 | 02/21/2014 |

| EXAMINER | ART UNIT | CLASS-SUBCLASS |
|---|---|---|
| BELUR, DEEPA | 2472 | 370-254000 |

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

| | |
|---|---|
| ❑ Applicant certifying micro entity status. See 37 CFR 1.29 | NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. |
| ❑ Applicant asserting small entity status. See 37 CFR 1.27 | NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status. |
| ❑ Applicant changing to regular undiscounted fee status. | NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable. |

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

8968 7590 11/21/2013

DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

| EXAMINER | |
|---|---|
| BELUR, DEEPA | |
| ART UNIT | PAPER NUMBER |
| 2472 | |

DATE MAILED: 11/21/2013

**Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)**
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 277 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 277 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Notices of Allowance and Fee(s) Due mailed between October 1, 2013 and December 31, 2013

(Addendum to PTOL-85)

If the "Notice of Allowance and Fee(s) Due" has a mailing date on or after October 1, 2013 and before January 1, 2014, the following information is applicable to this application.

If the issue fee is being timely paid on or after January 1, 2014, the amount due is the issue fee and publication fee in effect January 1, 2014. On January 1, 2014, the issue fees set forth in 37 CFR 1.18 decrease significantly and the publication fee set forth in 37 CFR 1.18(d)(1) decreases to $0.

If an issue fee or publication fee has been previously paid in this application, applicant is not entitled to a refund of the difference between the amount paid and the amount in effect on January 1, 2014.

| Notice of Allowability | Application No. 12/935,040 | Applicant(s) BOUCADAIR, MOHAMED | |
|---|---|---|---|
| | Examiner DEEPA BELUR | Art Unit 2472 | AIA (First Inventor to File) Status No |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--***

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *claim amendments filed on Aug 20 2013*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1-17*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   **Certified copies:**

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**.

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   **Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☒ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

| /D. B./ Examiner, Art Unit 2472 | /Hassan Kizou/ Supervisory Patent Examiner, Art Unit 2472 |
|---|---|

**EXAMINER'S AMENDMENT**

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Brian C. Rupp on November 12, 2013.

Claims 15-17 have been amended as follows:

**Claim 15:** A non-transitory computer readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 1.

**Claim 16:** A non-transitory computer readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 7

**Claim 17:** A non-transitory computer-readable medium encoded with program code instructions executable by a microprocessor to perform the method according to claim 11.

2. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEEPA BELUR whose telephone number is (571)270-3722. The examiner can normally be reached on Monday-Friday 8:30am to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. B./
Deepa Belur
Examiner, Art Unit 2472

/Hassan Kizou/
Supervisory Patent Examiner, Art Unit 2472

/D.B./ /D.B./

**EAST Search History**

**EAST Search History (Interference)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L41 | 0 | ((determin$3 with (port adj mask)) near (select$3 with identif$3) near (rout$3 with identif$3)).clm. | US-PGPUB; USPAT; UPAD | OR | ON | 2013/11/12 12:51 |
| L42 | 0 | ((determin$3 with port with mask) near2 (select$3 with identif$3) near2 (rout$3 with identif$3)).clm. | US-PGPUB; USPAT; UPAD | OR | ON | 2013/11/12 12:52 |
| L43 | 0 | ((determin$3 with mask) near2 (select$3 with identif$3) near2 (rout$3 with identif$3)).clm. | US-PGPUB; USPAT; UPAD | OR | ON | 2013/11/12 12:53 |

**11/12/2013 12:59:15 PM**
**C:\Users\dbelur\Documents\EAST\Workspaces\12935040\12935040.wsp**

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | Examiner | Art Unit |
| | DEEPA BELUR | 2472 |

| CPC- SEARCHED | | |
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| Symbol | Date | Examiner |
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| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 370 | 254, 351 | 8/21/2012 | DB |
| ABOVE | UPDATED | 2/21/2013 | DB |
| ABOVE | UPDATED | 5/13/2013 | DB |
| ABOVE | UPDATED | 11/12/2013 | DB |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| 370/254, 351 (text search only - see search history printout) | 8/21/2012 | DB |
| EAST (USPAT, USPGPUB, EPO, USOCR, FERS, JPO, DERWENT, IBM_TDB) - see search history printout | 8/21/2012 | DB |
| Inventor and assignee search in EAST - see search history printout | 8/21/2012 | DB |
| Consulted Primary (Charles Jiang) for 112 2nd, 112 6th, and search help | 5/13/2013 | DB |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | see Interference_SearchHistory_Printout | 11/12/2013 | DB |

| | |
|---|---|
| /D.B./<br>Examiner.Art Unit 2472 | |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | **Examiner** | **Art Unit** |
| | DEEPA BELUR | 2472 |

| CPC | | | | | | |
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| CPC Combination Sets | | | | | | | |
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| **Symbol** | | | | | **Type** | **Set** | **Ranking** | **Version** |
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| /DEEPA BELUR/<br>Examiner.Art Unit 2472 | | **Total Claims Allowed:** | |
|---|---|---|---|
| (Assistant Examiner) | (Date) | 17 | |
| /HASSAN KIZOU/<br>Supervisory Patent Examiner.Art Unit 2472 | 11/17/2013 | O.G. Print Claim(s) | O.G. Print Figure |
| (Primary Examiner) | (Date) | 1 | 6 |

| Issue Classification | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | **Examiner** | **Art Unit** |
| | DEEPA BELUR | 2472 |

| US ORIGINAL CLASSIFICATION | | INTERNATIONAL CLASSIFICATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CLASS | SUBCLASS | CLAIMED | | | | | NON-CLAIMED | | | | | |
| 370 | 254 | H | 0 | 4 | L | 12 / 28 (2006.0) | | | | | | |
| **CROSS REFERENCE(S)** | | | | | | | | | | | | |
| CLASS | SUBCLASS (ONE SUBCLASS PER BLOCK) | | | | | | | | | | | |
| 370 | 351 | | | | | | | | | | | |

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| /DEEPA BELUR/<br>Examiner.Art Unit 2472<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>17 | |
| /HASSAN KIZOU/<br>Supervisory Patent Examiner.Art Unit 2472<br><br>(Primary Examiner) | 11/17/2013<br><br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>6 |

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|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
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| | DEEPA BELUR | 2472 |

☒ **Claims renumbered in the same order as presented by applicant** ☐ **CPA** ☐ **T.D.** ☐ **R.1.47**

| Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original | Final | Original |
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| /DEEPA BELUR/<br>Examiner.Art Unit 2472<br><br>(Assistant Examiner) | (Date) | **Total Claims Allowed:**<br>17 | |
| /HASSAN KIZOU/<br>Supervisory Patent Examiner.Art Unit 2472<br><br>(Primary Examiner) | 11/17/2013<br><br>(Date) | O.G. Print Claim(s)<br>1 | O.G. Print Figure<br>6 |

/D.B./ /D.B./

**EAST Search History**

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L2 | 234 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:27 |
| L3 | 6926 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:27 |
| L4 | 11 | L2 and L3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:27 |
| L5 | 3833 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:32 |
| L6 | 5 | L2 and L5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:32 |
| L7 | 5 | L2 and L5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:32 |
| L8 | 2273999 | rout$3 with4 destination | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:32 |
| L9 | 6926 | 370/254.ccls. | US-PGPUB; | OR | ON | 2013/11/12 |

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|---|---|---|---|---|---|---|
| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 12:32 |
| L10 | 5156 | L9 and L8 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:32 |
| L11 | 375679 | (allocat$3 assign$3) same2 (address (port adj number$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:33 |
| L12 | 2068 | L10 and L11 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:33 |
| L13 | 181549 | (primary adj address) with3 ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:34 |
| L14 | 183 | L12 and L13 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:34 |
| L15 | 10155 | (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:34 |
| L16 | 259022 | "370".clas. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:34 |
| L17 | 4688 | L15 and L16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2013/11/12 12:34 |

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| | | | IBM_TDB | | | |
| L18 | 631 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:35 |
| L19 | 322 | L16 and L18 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:35 |
| L20 | 3833 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:36 |
| L21 | 7 | L20 and L18 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:36 |
| L22 | 3833 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:37 |
| L23 | 412 | (rout$3 transfer$4 transport$3 transmit$4) with (port adj number) near2 ((primary destination terminal (end adj point) client (terminal adj equipment) user$1) adj (address)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:37 |
| L24 | 6 | L23 and L22 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:37 |
| L25 | 487 | (rout$3 transfer$4 transport$3 transmit$4) with mask$3 near2 identif$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:38 |
| L26 | 5 | L25 and L22 | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2013/11/12 12:38 |

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| | | | EPO; JPO; DERWENT; IBM_TDB | | | |
| L27 | 6 | routing with ((primary secondary) adj destination adj address) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:39 |
| L28 | 1 | (select$3 choos$3 pick$3) same identifier same (destination adj equipment) same (port adj mask ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:39 |
| L29 | 43 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:39 |
| L30 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:39 |
| L31 | 6 | identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:40 |
| L32 | 15 | (address with (port adj mask$3) with identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:45 |
| L33 | 5 | (select$3 choos$3 pick$3 determin$5) same (ID identifier) same (destination adj (address equipment)) same (port adj mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:45 |
| L34 | 69 | (port adj mask$3) with identif$6 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:46 |
| L35 | 131 | (port adj mask$3) with (ID identif$6) | US-PGPUB; USPAT; | OR | ON | 2013/11/12 12:46 |

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| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| L36 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:46 |
| L37 | 8 | (select$3 choos$3 pick$3 assign$4) same (ID identifier) same address same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:46 |
| L38 | 1 | (port adj mask$3) with (routi$3 adj identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:46 |
| L39 | 60 | (software application process) with (portmask port adj mask port$1mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/12 12:47 |
| S1 | 15 | ((MOHAMED) near2 (BOUCADAIR)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2012/08/21 09:41 |
| S2 | 18 | ((MOHAMED) near2 (BOUCADAIR)).INV. | EPO; JPO; DERWENT | OR | ON | 2012/08/21 09:42 |
| S3 | 10702 | (france adj telecom).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S4 | 566 | routing and S3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S5 | 9991 | routing with (destination adj (address port)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S6 | 26 | S3 and S5 | US-PGPUB; | OR | ON | 2012/08/21 |

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| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 09:48 |
| S7 | 1 | "12935040" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 12:53 |
| S8 | 5 | "7320027" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 14:27 |
| S9 | 1 | (assign with (primary adj address)) same5 ((routing adj identifier) and (port adj (mask number))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:00 |
| S10 | 35 | (routing adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:01 |
| S11 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:28 |
| S12 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S13 | 6 | S11 and S12 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S14 | 3048 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2012/08/21 18:08 |

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| | | | IBM_TDB | | | |
| S15 | 5 | S11 and S14 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S16 | 2035277 | rout$3 with4 destination | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:17 |
| S17 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S18 | 4037 | S17 and S16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S19 | 333179 | (allocat$3 assign$3) same2 (address (port adj number$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:21 |
| S20 | 1713 | S18 and S19 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:22 |
| S22 | 220 | (primary adj address) and ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:25 |
| S24 | 155303 | (primary adj address) with3 ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S25 | 152 | S20 and S24 | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2012/08/22 09:26 |

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| | | | EPO; JPO; DERWENT; IBM_TDB | | | |
| S26 | 6 | "7751339" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:27 |
| S27 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:19 |
| S28 | 11 | "60455353" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:45 |
| S29 | 8356 | (port adj number) near2 (destination terminal (end adj point)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:31 |
| S30 | 9390 | (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:34 |
| S31 | 214176 | "370".clas. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S32 | 4352 | S30 and S31 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S33 | 584 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:37 |
| S34 | 294 | S31 and S33 | US-PGPUB; USPAT; | OR | ON | 2013/02/21 13:38 |

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| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S35 | 1 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port adj mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:02 |
| S36 | 3 | "20090219834" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:06 |
| S37 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:12 |
| S38 | 3205 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:48 |
| S39 | 7 | S38 and S33 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:49 |
| S40 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment) user$1) with (mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:56 |
| S48 | 384 | (rout$3 transfer$4 transport$3 transmit$4) with (port adj number) near2 ((primary destination terminal (end adj point) client (terminal adj equipment) user$1) adj (address)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:11 |
| S50 | 6 | S48 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:12 |

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|---|---|---|---|---|---|---|
| S51 | 415 | (rout$3 transfer$4 transport$3 transmit$4) with mask$3 near2 identif$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:23 |
| S52 | 4 | S51 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:24 |
| S53 | 109 | ("20010005876" \| "20010015976" \| "20010025315" \| "20010028651" \| "20010048661" \| "20020184387" \| "20020191605" \| "20030005210" \| "20030026259" \| "20030028713" \| "20030069973" \| "20030154380" \| "20030165144" \| "20030169612" \| "20030193949" \| "20040003110" \| "20040015683" \| "20040100956" \| "20040120173" \| "20040202162" \| "20040205056" \| "20040205753" \| "20040208197" \| "20040246981" \| "20040258062" \| "20050055339" \| "20050074009" \| "20050180429" \| "20050190639" \| "20050198362" \| "20050226242" \| "20050281191" \| "20060007917" \| "20060039374" \| "20060056420" \| "20060092950" \| "20060106934" \| "20060233168" \| "20070291791" \| "20080034112" \| "20080075078" \| "20080186968" \| "20080205264" \| "20080222094" \| "5072443" \| "5282270" \| "5473599" \| "5764636" \| "5852607" \| "5923660" \| "5999518" \| "6034957" \| "6098109" \| "6172980" \| "6173333" \| "6208649" \| "6256314" \| "6275861" \| "6295299" \| "6351801" \| "6362990" \| "6381162" \| "6381242" \| "6384750" \| "6397260" \| "6463067" \| "6515963" \| "6553002" \| "6570877" \| "6631465" \| "6658002" \| "6661791" \| "6735670" \| "6738892" \| "6763023" \| "6765881" \| "6792502" \| "6842791" \| "6871262" \| "6882642" \| "6888797" \| "6914905" \| "6917617" \| "6957258" \| "6975581" \| "6976158" \| "6980552" \| "6999462" \| "7062398" \| "7062641" \| "7079407" \| "7092354" \| "7111101" \| "7139271" \| "7152191" \| "7154902" \| "7190696" \| "7212837" \| "7248584" \| "7248585" \| "7260648" \| "7274693" \| "7286520" \| "7296100" \| "7304996" \| "7444405" \| "7487938" \| "7515589" \| "7561531").PN. OR ("7894451").URPN. | US-PGPUB; USPAT; USOCR | OR | ON | 2013/02/22 10:03 |
| S54 | 5 | routing with ((primary secondary) adj destination adj address) | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2013/05/10 15:24 |

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|---|---|---|---|---|---|---|
| | | | EPO; JPO; DERWENT; IBM_TDB | | | |
| S55 | 1 | (select$3 choos$3 pick$3) same identifier same (destination adj equipment) same (port adj mask ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 11:52 |
| S56 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 11:52 |
| S57 | 41 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 12:12 |
| S59 | 6 | identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 12:31 |
| S60 | 2 | "20070233704" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 13:32 |
| S63 | 14 | (address with (port adj mask$3) with identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 15:57 |
| S64 | 5 | (select$3 choos$3 pick$3 determin$5) same (ID identifier) same (destination adj (address equipment)) same (port adj mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 16:23 |
| S65 | 57 | (port adj mask$3) with identif$6 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 16:35 |
| S66 | 119 | (port adj mask$3) with (ID identif$6) | US-PGPUB; USPAT; | OR | ON | 2013/05/13 16:35 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S68 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:16 |
| S69 | 3 | (select$3 choos$3 pick$3) same (ID identifier) same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:17 |
| S70 | 8 | (select$3 choos$3 pick$3 assign$4) same (ID identifier) same address same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:18 |
| S71 | 1 | (port adj mask$3) with (routi$3 adj identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 19:00 |
| S72 | 60 | (software application process) with (portmask port adj mask port$1mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/11/04 11:16 |

**11/12/2013 12:47:59 PM**
**C:\Users\dbelur\Documents\EAST\Workspaces\12935040\12935040.wsp**

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: 2472

Application No. 12/935,040

Examiner: Deepa Belur

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**RESPONSE TO OFFICE ACTION OF MAY 20, 2013**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Madam:

In response to the Office Action of May 20, 2013, please enter the following amendments and consider the following remarks:

**Amendments to the Claims** are provided in a listing of claims, which begins on page 2 of this paper.

**Remarks** begin on page 7 of this paper.

**Listing of Claims**

This listing of claims will replace all prior versions and listings of claims in the application.

Claim 1 (previously presented): A method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, said method comprising, on reception of said packet, the following steps:

· determining a port mask assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting at least one identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· routing the packet to the destination equipment based on said identifier.

Claim 2 (previously presented): The method according to claim 1 of routing an IP data packet, wherein said at least one identifier is a secondary destination address of the destination equipment.

Claim 3 (previously presented): The method according to claim 2 of routing an IP data packet, comprising, before the routing step, a step of transforming the packet by adding said secondary address to the packet, and routing the packet based on said secondary destination address.

Claim 4 (previously presented): The routing method according to claim 1, wherein the at least one identifier is a route identifier specific to said destination equipment and the packet is routed based on said specific route identifier.

Claim 5 (currently amended): A device for routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary

destination address and a destination port number, wherein said device comprises, on reception of said packet~~, means for~~:

· a processor that determines ~~determining~~ a port mask assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· the processor selects ~~selecting~~ an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· a communication unit that routes ~~routing~~ the packet to the destination equipment based on said identifier.

Claim 6 (currently amended): Telecommunications network equipment adapted to receive an IP data packet comprising a primary destination address and a destination port number, comprising at least one routing device comprising ~~means for~~:

· a processor that determines ~~determining~~ a port mask assigned to a destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· the processor selects ~~selecting~~ an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· a communication unit that routes ~~routing~~ the packet to the destination equipment based on said identifier.

Claim 7 (previously presented): A method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

Claim 8 (previously presented): The method according to claim 7 of configuring a piece of terminal equipment, comprising a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment, and the configuration message further comprising said routing device identifier.

Claim 9 (previously presented): The configuration method according to claim 7, wherein said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address.

Claim 10 (currently amended): A configuration server in a telecommunications network, wherein, on reception of a configuration request sent by a piece of terminal equipment, ~~comprises means for~~ comprising:

· a processor that assigns ~~assigning~~ a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;

· the processor assigns ~~assigning~~ to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· a communication unit that sends ~~sending~~ to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

Claim 11 (previously presented): A method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as

source address the primary address of said piece of terminal equipment and as source port number the selected port number.

Claim 12 (previously presented): The configuration method according to claim 11, wherein, once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device.

Claim 13 (previously presented): The configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.

Claim 14 (currently amended): A piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to the piece of client terminal equipment, and a routing identifier, the piece of client terminal equipment comprising ~~means for~~:

· a memory that stores ~~storing~~ said configuration data;

· before sending a data packet in the telecommunications network, a processor that selects ~~selecting~~ a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number.

Claim 15 (currently amended): A non-transitory computer program product ~~stored on~~ comprising a computer-readable medium and executable by a microprocessor, the computer-readable medium comprising program code instructions for executing the routing method according to claim 1.

Claim 16 (currently amended): A non-transitory computer program product ~~stored on~~ comprising a computer-readable medium and executable by a microprocessor, the computer-readable medium comprising program code instructions for executing the configuration method according to claim 7.

Claim 17 (currently amended): A non-transitory computer program product ~~stored on~~ comprising a computer-readable medium and executable by a microprocessor, the computer-readable medium comprising program code instructions for executing the method according to claim 11.



Juniper Exhibit 1002, page 51

## REMARKS

The following remarks are responsive to the Office Action of May 20, 2013.

At the time of the Office Action, claims 1–17 were pending. The status of the claims is as follows:

- Claims 15–17 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter;
- Claims 5, 6, 10, and 14 were rejected under 35 U.S.C. § 112, first and second paragraphs;
- Claims 5, 6, 10, and 14 were interpreted (not rejected) under 35 U.S.C. § 112, sixth paragraph;
- Claims 7–17 were rejected under 35 U.S.C. § 103(a) as being obvious over Baum (U.S. Patent Application Publication No. 2011/0067119) in view of Davis (U.S. Patent Application Publication No. 2009/0279548);
- Claims 1–4 were allowed; and
- Claims 5 and 6 were indicated as allowable.

Applicant thanks the Examiner for the indication of allowable subject matter.

Applicant herein amends claims 5, 6, 10, 14, and 15–17 to address the issues raised in the Office Action. Non-limiting support for the amendments can be found in at least page 15 at lines 14–20, page 19 at lines 18–24, FIGS. 5 and 8 and supporting descriptive portions of the application as filed. No new matter has been added. Applicant presents discussion below distinguishing the claims from the art cited against them.

### 35 U.S.C. § 101 Rejection of Claims 15–17

*1. Applicant herein amends claims 15–17 to recite a "non-transitory computer program product comprising a computer-readable medium and executable by a microprocessor."*

In the Office Action, claims 15–17 were rejected as being directed to non-statutory subject matter. Office Action, p. 2. The Examiner suggested amending the claims to recite "A

non-transitory computer-readable program and executable by a microprocessor." Office Action, p. 2.

Consistent with the Examiner's suggestion, Applicant herein amends claims 15–17 to recite a "non-transitory computer program product comprising a computer-readable medium and executable by a microprocessor." Based on the amended claim language, Applicant respectfully submits that amended claims 15–17 are now directed to statutory subject matter. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 101 be withdrawn.

**35 U.S.C. § 112 Rejections of Claims 5, 6, 10 and 14**

*2. Applicant herein amends claims 5, 6, and 10 to recite a "processor" and a "communication unit" and amends claim 14 to recite a "processor" and a "memory."*

In the Office Action, claims 5, 6, 10 and 14 were rejected under 35 U.S.C. § 112, first paragraph, because they are single means claims. Office Action, p. 3. Claims 5, 6, 10, and 14 were also rejected under § 112, second paragraph, as being indefinite. Office Action, pp. 3–4.

In response, Applicant herein amends claims 5, 6, and 10 to recite a "processor" and a "communication unit" and amends claim 14 to recite a "processor" and a "memory." Non-limiting support for the amendments can be found in at least page 15 at lines 14–20, page 19 at lines 18–24, FIGS. 5 and 8 and supporting descriptive portions of the application as filed. No new matter has been added. Based on the amended claim language, Applicant respectfully submits that the amended claims are based on structure and are definite. Accordingly, Applicant respectfully requests that the rejections under 35 U.S.C. § 112 be withdrawn.

**35 U.S.C. § 103(a) Rejection of Claims 7–17 over Baum in view of Davis**

*3. Baum in view of Davis fails to disclose, teach, or suggest the "assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier" or "sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier" as recited in independent claim 7.*

In the Office Action, independent claim 7 was rejected as being obvious over Baum in view of Davis. Office Action, pp. 4–5. The Office Action stated that Baum does not explicitly disclose "assigning to said piece of terminal equipment a port mask defining a range of numbers

dedicated to it and a routing identifier" or "sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier." Office Action, p. 4. The Office Action then cited Davis as disclosing the above limitations. Office Action, p. 5. In response, Applicant respectfully disagrees with the Office Action's characterization of Davis and asserts that Davis fails to disclose, teach, or suggest the "port mask" and thus the above limitations as required by claim 7.

Davis discloses a "switching device comprising one or more processors coupled to a media access control (MAC) interface and a memory structure for switching packets rapidly between one or more source devices and one or more destination devices." Davis, Abstract. This switch or router includes:

> a printed circuit board ("PCB") 10 used to house and provide interconnections for a media access controller ("MAC") 12, a packet processor ("PP") 14, one or more content addressable memory controllers ("CAM") 16, one or more controllers for random access memories containing parameter information processors ("PRAM") 18, a receive dual-port memory buffer 20, a transmit dual-port memory buffer 22, a transmission manager 24, and a backplane interface 26.

Davis, ¶ [0024]. Davis then discloses that the "PCB 10 provides a surface on which to place other components of the invention" and that the "PCB 10, also known as a 'blade' or 'module,' can be inserted into a slot on the chassis of a network traffic management device such as a switch or a router." Davis, ¶ [0025]. Furthermore, Davis teaches that "additional ports for increased network connectivity may [be] easily added by plugging additional blades into free slots located in the chassis." Davis, ¶ [0025] (emphasis added). Based on Davis's disclosure, a "port" is a physical output interface of Davis's router, and not a "port" as recited in the claims (an application-specific or process-specific software construct associated with a destination terminal). *See* e.g., Response to Office Action of March 1, 2013, p. 8.

According to Davis, each port in the chassis is identified by a "port mask": "The port mask is a multi-bit field representing a port on the blade and also other possible backplane slot destinations in the device chassis. . . . [T]he port mask is an 8-bit field representing a 10 Gigabit Ethernet port on the blade and seven other possible backplane slot destinations." Davis, ¶ [0100] (emphasis added). Each "port mask" according to Davis identifies the output port used to forward data packets to a given destination device: "In an Ethernet environment, each packet header contains a destination address and a source address. The source address must be changed

on transmit to reflect which port the packet is being broadcast from." Davis, ¶ [0128] (emphasis added). Thus, the "port mask" according to Davis cannot be equated to the "port mask" as recited in claim 7, which is defined as "a range of numbers dedicated to it" (i.e., a plurality of numbers associated with a single piece of terminal equipment), and not a single number as disclosed by Davis (e.g., represented by an 8-bit field).

Finally, Davis uses a plurality of "port mask" numbers, called a "merge port mask," for sending a packet data to a plurality of "intended destinations." Davis, ¶¶ [0102]–[0103]. Again, Davis does not disclose, teach, or suggest the "port mask" as recited in claim 7, i.e., a range of numbers dedicated to a single destination terminal. Because Davis does not disclose the "port mask" as required by claim 7, Davis thus fails to teach or suggest "assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier" or "sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier" as recited in claim 7.

For at least the foregoing reasons, Baum in view of Davis does not disclose, teach, or suggest all the limitations of independent claim 7 and thus cannot render claim 7 obvious. Because independent claims 10, 11, and 14 require the same definition of "port mask" as claim 7, they are likewise not obvious over Baum and Davis. By virtue of their dependence from the independent claims, claims 8, 9, 12, 13, 16, and 17 are also not obvious for at least the reasons presented with respect to claim 7. Since claim 15 requires the limitations of allowed claim 1, Applicant submits that claim 15 is novel and not obvious over the cited art for at least the same reasons as allowed claim 1. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 103(a) be withdrawn and that claims 7–17 be allowed.

**Conclusion**

In view of the foregoing amendments and remarks, the application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/brian c. rupp/

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Date: August 20, 2013

CH01/ 26203720.2



Juniper Exhibit 1002, page 56

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 16632398 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 20-AUG-2013 |
| **Filing Date:** | 28-SEP-2010 |
| **Time Stamp:** | 12:54:57 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P3594US_Response_to_Office_Action.pdf | 132427<br>d563174b1e304b9420f0df7919d2f35100e95f38 | yes | 11 |

| | Multipart Description/PDF files in .zip description | | |
|---|---|---|---|
| | **Document Description** | **Start** | **End** |
| | Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 1 |
| | Claims | 2 | 6 |
| | Applicant Arguments/Remarks Made in an Amendment | 7 | 11 |
| **Warnings:** | | | |
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**New Applications Under 35 U.S.C. 111**
**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

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**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

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PTO/SB/06 (09-11)
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>12/935,040 | Filing Date<br>09/28/2010 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

AMENDMENT **08/20/2013**

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 17 | Minus | ** 20 | = 0 | X $80 = | 0 |
| Independent (37 CFR 1.16(h)) | * 7 | Minus | ***7 | = 0 | X $420 = | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | 0 |

AMENDMENT

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/TRACIE ROBERTSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

8968 7590 05/20/2013

DRINKER BIDDLE & REATH LLP
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191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

| EXAMINER | |
|---|---|
| BELUR, DEEPA | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2472 | |

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|---|---|
| 05/20/2013 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DBRIPDocket@dbr.com
IPDockets@dbr.com

| Office Action Summary | Application No. 12/935,040 | Applicant(s) BOUCADAIR, MOHAMED | |
|---|---|---|---|
| | Examiner DEEPA BELUR | Art Unit 2472 | AIA (First Inventor to File) Status No |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *30 April 2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

5)☒ Claim(s) *1-17* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☒ Claim(s) *1-4* is/are allowed.

7)☒ Claim(s) *5-17* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *28 September 2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

a)☒ All b)☐ Some * c)☐ None of the:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Interim copies:**

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

## DETAILED ACTION

1. This action is in response to the Applicant's Arguments filed on April 30th, 2013.

2. Claims 1-17 are pending.

3. Independent claims 1 to 4 are allowable.

4. Claims 5-17 have been examined and rejected under new grounds of rejection.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

During patent Examination, pending claims must be interpreted as broadly as their terms reasonably allow. The broadest reasonable interpretation of a claim drawn to a computer readable medium (also called machine readable medium and other such variations) typically covers forms of non-transitory tangible media and transitory propagating signals *per se* in view of the ordinary and customary meaning of computer readable media. When the broadest reasonable interpretation of a claim covers a signal *per se,* the claim must be rejected under 35 US.C. § 101 as covering non-statutory subject matter. *See In re Nuijten,* 500 F.3d 1346, 1356-57 (Fed. Cir. 2007) (transitory embodiments are not directed to statutory subject matter) and *Interim Examination Instructions for Evaluating Subject Matter Eligibility under* 35 *U.S.*C. § *101,* Aug. 24, 2009; p. 2.

5. Claims 15-17 are rejected under 35 U.S.C. 101 as covering non-statutory subject. Claims 15-17 are directed to a computer readable storage medium. Under the broadest reasonable interpretation, a computer readable storage medium covers transitory signals which are not statutory.

Examiner suggests amending the claims to cover only statutory embodiments to avoid a rejection under 35 U.S.C. § 101 by adding the limitation "A non-transitory computer-readable program and executable by a microprocessor" to the claims.

***Claim Rejections - 35 USC § 112***

The following is a quotation of 35 U.S.C. 112(a):
(a) IN GENERAL.—The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or joint inventor of carrying out the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), first paragraph:
The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 5, 6, 10 and 14 are rejected under 35 U.S.C. 112, first paragraph, because claims 5, 6, 10 and 14 are a single means claim. MPEP 2164.08(a), Single Means Claim: "A single means claim, i.e., where a means recitation does not appear in combination with another recited element of means, is subject to an undue breadth rejection under 35 U.S.C. 112, first paragraph. In re Hyatt, 708 F.2d 712, 714-715, 218 USPQ 195, 197 (Fed. Cir. 1983) (A single means claim which covered every conceivable means for achieving the stated purpose was held nonenabling for the scope of the claim because the specification disclosed at most only those means known to the inventor.). When claims depend on a recited property, a fact situation comparable to Hyatt is possible, where the claim covers every conceivable structure (means) for achieving the stated property (result) while the specification discloses at most only those known to the inventor."

The following is a quotation of 35 U.S.C. 112(b):

(B) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 5, 6, 10 and 14 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

8. Regarding claims 5, 6, 10 and 14, the claim limitation "*means for interpreting…*" has been interpreted to invoke 112 (pre-AIA), sixth paragraph. However, the specification does not describe a corresponding structure that would achieve the claimed function.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 7-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baum (US20110067119A1) in view of Davis (US20090279548A1).

**Regarding Claim 7**, Baum discloses a method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network), the following steps:

assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment (see FIG. 10 IP address/primary address, allocation and management unit. The DHCP server assigns IP addresses to a plurality of clients);

Although Baum teaches using port numbers, Baum does not explicitly disclose:

assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier (see page 9, paragraph 0099-0100, FIG. 6, the dual port interface extracts forwarding identifier FID/routing identifier, from the packet. The FID interface translates the FID into a port mask. The port mask is a multi-bit field representing a port on the blade and also other possible backplane slot destinations in the device chassis); and

sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 8**, Baum discloses the method according to claim 7 of configuring a piece of terminal equipment, comprising

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment and

the configuration message further comprising said routing device identifier

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment (see page 9, paragraph 0099-0100, FIG. 6, the dual port

interface extracts forwarding identifier FID/routing identifier, from the packet. The FID interface translates the FID into a port mask. The port mask is a multi-bit field representing a port on the blade and also other possible backplane slot destinations in the device chassis) and

the configuration message further comprising said routing device identifier (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier) Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 9**, Baum discloses the configuration method according to claim 7, wherein said Although Baum teaches using port numbers, Baum does not explicitly disclose:

configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address. However, Davis teaches a switching device for rapidly switching packets, it further discloses:

configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 10**, Baum discloses a configuration server in a telecommunications network (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network), wherein, on reception of a configuration request sent by a piece of terminal equipment, comprises means for:

assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment (see FIG. 10 IP address/primary address, allocation and management unit. The DHCP server assigns IP addresses to a plurality of clients);

Although Baum teaches using port numbers, Baum does not explicitly disclose:

assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier (see page 9, paragraph 0099-0100, FIG. 6, the dual port interface extracts forwarding identifier FID/routing identifier, from the packet. The FID interface translates the FID into a port mask. The port mask is a multi-bit field representing a port on the blade and also other possible backplane slot destinations in the device chassis); and

sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to

the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 11**, Baum discloses a method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:

Although Baum teaches using port numbers, Baum does not explicitly disclose:

storing said configuration data; and

before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

storing said configuration data (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical

destination/routing identifier. The FID with the configuration data is stored in the FID RAM 614 as shown in FIG. 6); and

before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number (see page 9, paragraphs 0100-0103, see FIG. 6; when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. A FID may also indicate a physical destination/routing identifier. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 12**, Baum discloses the configuration method according to claim 11, wherein, Although Baum teaches using port numbers, Baum does not explicitly disclose:

once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device.

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is

combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 13**, Baum discloses the configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a

Although Baum teaches using port numbers, Baum does not explicitly disclose:

step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative (see page 11, paragraph 0118, see FIG.8, If the FID lookup block 808 determines that a packet has been erroneously received, the packet is deleted and no longer processed. The FID lookup block 808 functions as a transmit filter to ensure that only valid packets are actually sent out over the network).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 14**, Baum discloses a piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to the piece of client

terminal equipment, and a routing identifier, the piece of client terminal equipment comprising means for:

Although Baum teaches using port numbers, Baum does not explicitly disclose:

storing said configuration data;

before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number.

However, Davis teaches a switching device for rapidly switching packets, it further discloses:

storing said configuration data (see page 9, paragraph 0102-0103, FIG. 6, when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations. The merge port mask result is combined with the CPU and monitor information stored in the configuration registers/configuration message, of the backplane manager. A FID may also indicate a physical destination/routing identifier. The FID with the configuration data is stored in the FID RAM 614 as shown in FIG. 6);

before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number (see page 9, paragraphs 0100-0103, see FIG. 6; when the FID lookup is complete, the results are passed from the FID lookup interface to the merge port mask. A FID may also indicate a physical destination/routing identifier. The merge port mask integrates the data with the appropriate FID lookup port mask result and other port masks to ensure that the data is transmitted to all intended destinations).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Davis to process packets, the motivation being it would teach Baum, efficient data transfer (see page 1, paragraph 0009).

**Regarding Claim 15**, Baum discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the routing method according to claim 1 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

**Regarding Claim 16**, Baum discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the configuration method according to claim 7 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

**Regarding Claim 17**, Baum discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the method according to claim 11 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

***Allowable Subject Matter***

10. Independent Claims 1, 5 and 6 are allowable.

The following is a statement of reasons for the indication of allowable subject matter: The following limitation from Claims 1, 5 and 6 is allowable, as the prior art does not teach or suggest:

"*determining a port mask assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;*

*selecting at least one identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask*;"

Claims 2-4 depend on Claim 1, thus they are allowable for the same reason.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEEPA BELUR whose telephone number is (571)270-3722. The examiner can normally be reached on Monday-Friday 8:30am to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. B./
Deepa Belur
Examiner, Art Unit 2472

/CHARLES C JIANG/

Primary Examiner, Art Unit 2472

| Notice of References Cited | Application/Control No. 12/935,040 | Applicant(s)/Patent Under Reexamination BOUCADAIR, MOHAMED | |
|---|---|---|---|
| | Examiner DEEPA BELUR | Art Unit 2472 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-2003/0053448 A1 | 03-2003 | Craig et al. | 370/353 |
| * | B | US-2009/0279548 A1 | 11-2009 | Davis et al. | 370/394 |
| * | C | US-7,894,451 B2 | 02-2011 | Parker et al. | 370/395.32 |
| * | D | US-2011/0067119 A1 | 03-2011 | Baum, Robert T. | 726/34 |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
| | O | | | | | |
| | P | | | | | |
| | Q | | | | | |
| | R | | | | | |
| | S | | | | | |
| | T | | | | | |

**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | Examiner | Art Unit |
| | DEEPA BELUR | 2472 |

| CPC- SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| CPC COMBINATION SETS - SEARCHED | | |
|---|---|---|
| Symbol | Date | Examiner |
| | | |

| US CLASSIFICATION SEARCHED | | | |
|---|---|---|---|
| Class | Subclass | Date | Examiner |
| 370 | 254, 351 | 8/21/2012 | DB |
| ABOVE | UPDATED | 2/21/2013 | DB |
| ABOVE | UPDATED | 5/13/2013 | DB |

| SEARCH NOTES | | |
|---|---|---|
| Search Notes | Date | Examiner |
| 370/254, 351 (text search only - see search history printout) | 8/21/2012 | DB |
| EAST (USPAT, USPGPUB, EPO, USOCR, FERS, JPO, DERWENT, IBM_TDB) - see search history printout | 8/21/2012 | DB |
| Inventor and assignee search in EAST - see search history printout | 8/21/2012 | DB |
| Consulted Primary (Charles Jiang) for 112 2nd, 112 6th, and search help | 5/13/2013 | DB |

| INTERFERENCE SEARCH | | | |
|---|---|---|---|
| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
| | | | |

| | |
|---|---|
| /D.B./<br>Examiner.Art Unit 2472 | |

Receipt date: 04/30/2013



OK to Enter /D.B./

05/09/2013

**RESPONSE UNDER 37 CFR 1.116**
**EXPEDITED PROCEDURE**
**EXAMINING GROUP 2472**

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Application No. 12/935,040

Filed: September 28, 2010

Group Art Unit: 2472

Examiner: Deepa Belur

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**RESPONSE TO FINAL OFFICE ACTION OF MARCH 1, 2013**

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Madam:

In response to the Final Office Action of March 1, 2013, please enter the following amendments and consider the following remarks:

**Amendments to the Claims** are provided in a listing of claims, which begins on page 2 of this paper.

**Remarks** begin on page 6 of this paper.

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | **Examiner** | **Art Unit** |
| | DEEPA BELUR | 2472 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 08/24/2012 | 02/22/2013 | 05/13/2013 | | | | | | |
| | 1 | ✓ | ✓ | = | | | | | | |
| | 2 | ✓ | ✓ | = | | | | | | |
| | 3 | ✓ | ✓ | = | | | | | | |
| | 4 | ✓ | ✓ | = | | | | | | |
| | 5 | ✓ | ✓ | ✓ | | | | | | |
| | 6 | ✓ | ✓ | ✓ | | | | | | |
| | 7 | ✓ | ✓ | ✓ | | | | | | |
| | 8 | ✓ | ✓ | ✓ | | | | | | |
| | 9 | ✓ | ✓ | ✓ | | | | | | |
| | 10 | ✓ | ✓ | ✓ | | | | | | |
| | 11 | ✓ | ✓ | ✓ | | | | | | |
| | 12 | ✓ | ✓ | ✓ | | | | | | |
| | 13 | ✓ | ✓ | ✓ | | | | | | |
| | 14 | ✓ | ✓ | ✓ | | | | | | |
| | 15 | ✓ | ✓ | ✓ | | | | | | |
| | 16 | ✓ | ✓ | ✓ | | | | | | |
| | 17 | ✓ | ✓ | ✓ | | | | | | |

**EAST Search History** /D.B/ /D.B/

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| L1 | 1 | (port adj mask$3) with (routi$3 adj identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 19:00 |
| S1 | 15 | ((MOHAMED) near2 (BOUCADAIR)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2012/08/21 09:41 |
| S2 | 18 | ((MOHAMED) near2 (BOUCADAIR)).INV. | EPO; JPO; DERWENT | OR | ON | 2012/08/21 09:42 |
| S3 | 10702 | (france adj telecom).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S4 | 566 | routing and S3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S5 | 9991 | routing with (destination adj (address port)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S6 | 26 | S3 and S5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S7 | 1 | "12935040" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 12:53 |
| S8 | 5 | "7320027" | US-PGPUB; USPAT; USOCR; | OR | ON | 2012/08/21 14:27 |

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| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S9 | 1 | (assign with (primary adj address)) same5 ((routing adj identifier) and (port adj (mask number))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:00 |
| S10 | 35 | (routing adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:01 |
| S11 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:28 |
| S12 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S13 | 6 | S11 and S12 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S14 | 3048 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S15 | 5 | S11 and S14 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S16 | 2035277 | rout$3 with4 destination | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:17 |
| S17 | 4877 | 370/254.ccls. | US-PGPUB; | OR | ON | 2012/08/22 |

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| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 09:18 |
| S18 | 4037 | S17 and S16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S19 | 333179 | (allocat$3 assign$3) same2 (address (port adj number$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:21 |
| S20 | 1713 | S18 and S19 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:22 |
| S22 | 220 | (primary adj address) and ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:25 |
| S24 | 155303 | (primary adj address) with3 ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S25 | 152 | S20 and S24 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S26 | 6 | "7751339" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:27 |
| S27 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2012/08/22 17:19 |

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|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S28 | 11 | "60455353" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:45 |
| S29 | 8356 | (port adj number) near2 (destination terminal (end adj point)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:31 |
| S30 | 9390 | (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:34 |
| S31 | 214176 | "370".clas. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S32 | 4352 | S30 and S31 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S33 | 584 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:37 |
| S34 | 294 | S31 and S33 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:38 |
| S35 | 1 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port adj mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:02 |
| S36 | 3 | "20090219834" | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2013/02/21 15:06 |

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|---|---|---|---|---|---|---|
| | | | EPO; JPO; DERWENT; IBM_TDB | | | |
| S37 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:12 |
| S38 | 3205 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:48 |
| S39 | 7 | S38 and S33 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:49 |
| S40 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment) user$1) with (mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:56 |
| S48 | 384 | (rout$3 transfer$4 transport$3 transmit$4) with (port adj number) near2 ((primary destination terminal (end adj point) client (terminal adj equipment) user$1) adj (address)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:11 |
| S50 | 6 | S48 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:12 |
| S51 | 415 | (rout$3 transfer$4 transport$3 transmit$4) with mask$3 near2 identif$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:23 |
| S52 | 4 | S51 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:24 |
| S53 | 109 | ("20010005876" \| "20010015976" \| "20010025315" \| "20010028651" \| | US-PGPUB; USPAT; | OR | ON | 2013/02/22 10:03 |

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|---|---|---|---|---|---|---|
| | | "20010048661" \| "20020184387" \| "20020191605" \| "20030005210" \| "20030026259" \| "20030028713" \| "20030069973" \| "20030154380" \| "20030165144" \| "20030169612" \| "20030193949" \| "20040003110" \| "20040015683" \| "20040100956" \| "20040120173" \| "20040202162" \| "20040205056" \| "20040205753" \| "20040208197" \| "20040246981" \| "20040258062" \| "20050055339" \| "20050074009" \| "20050180429" \| "20050190639" \| "20050198362" \| "20050226242" \| "20050281191" \| "20060007917" \| "20060039374" \| "20060056420" \| "20060092950" \| "20060106934" \| "20060233168" \| "20070291791" \| "20080034112" \| "20080075078" \| "20080186968" \| "20080205264" \| "20080222094" \| "5072443" \| "5282270" \| "5473599" \| "5764636" \| "5852607" \| "5923660" \| "5999518" \| "6034957" \| "6098109" \| "6172980" \| "6173333" \| "6208649" \| "6256314" \| "6275861" \| "6295299" \| "6351801" \| "6362990" \| "6381162" \| "6381242" \| "6384750" \| "6397260" \| "6463067" \| "6515963" \| "6553002" \| "6570877" \| "6631465" \| "6658002" \| "6661791" \| "6735670" \| "6738892" \| "6763023" \| "6765881" \| "6792502" \| "6842791" \| "6871262" \| "6882642" \| "6888797" \| "6914905" \| "6917617" \| "6957258" \| "6975581" \| "6976158" \| "6980552" \| "6999462" \| "7062398" \| "7062641" \| "7079407" \| "7092354" \| "7111101" \| "7139271" \| "7152191" \| "7154902" \| "7190696" \| "7212837" \| "7248584" \| "7248585" \| "7260648" \| "7274693" \| "7286520" \| "7296100" \| "7304996" \| "7444405" \| "7487938" \| "7515589" \| "7561531").PN. OR ("7894451").URPN. | USOCR | | | |
| S54 | 5 | routing with ((primary secondary) adj destination adj address) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/10 15:24 |
| S55 | 1 | (select$3 choos$3 pick$3) same identifier same (destination adj equipment) same (port adj mask ) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 11:52 |
| S56 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2013/05/13 11:52 |

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|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S57 | 41 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 12:12 |
| S59 | 6 | identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 12:31 |
| S60 | 2 | "20070233704" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 13:32 |
| S61 | 0 | assign$3 near (address with (port adj mask$3) with identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 15:55 |
| S62 | 0 | (desginat$3 assign$3) near2 (address with (port adj mask$3) with identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 15:57 |
| S63 | 14 | (address with (port adj mask$3) with identif$6) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 15:57 |
| S64 | 5 | (select$3 choos$3 pick$3 determin$5) same (ID identifier) same (destination adj (address equipment)) same (port adj mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 16:23 |
| S65 | 57 | (port adj mask$3) with identif$6 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 16:35 |
| S66 | 119 | (port adj mask$3) with (ID identif$6) | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2013/05/13 16:35 |

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|---|---|---|---|---|---|---|
| | | | EPO; JPO; DERWENT; IBM_TDB | | | |
| S68 | 3 | (select$3 choos$3 pick$3) same identifier same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:16 |
| S69 | 3 | (select$3 choos$3 pick$3) same (ID identifier) same (destination adj (address equipment)) same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:17 |
| S70 | 8 | (select$3 choos$3 pick$3 assign$4) same (ID identifier) same address same port adj mask$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/05/13 18:18 |

**5/ 13/ 2013 8:23:40 PM**
**C:\ Users\ dbelur\ Documents\ EAST\ Workspaces\ 12935040\ 12935040.wsp**

**RESPONSE UNDER 37 CFR 1.116**
**EXPEDITED PROCEDURE**
**EXAMINING GROUP 2472**

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Application No. 12/935,040

Filed: September 28, 2010

Group Art Unit: 2472

Examiner: Deepa Belur

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**RESPONSE TO FINAL OFFICE ACTION OF MARCH 1, 2013**

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Madam:

In response to the Final Office Action of March 1, 2013, please enter the following amendments and consider the following remarks:

**Amendments to the Claims** are provided in a listing of claims, which begins on page 2 of this paper.

**Remarks** begin on page 6 of this paper.

**Listing of Claims**

This listing of claims will replace all prior versions and listings of claims in the application.

Claim 1 (currently amended): A method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, said method comprising, on reception of said packet, the following steps:

· determining a port mask [[to be]] assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting at least one identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· routing the packet to the destination equipment based on said identifier.

Claim 2 (previously presented): The method according to claim 1 of routing an IP data packet, wherein said at least one identifier is a secondary destination address of the destination equipment.

Claim 3 (previously presented): The method according to claim 2 of routing an IP data packet, comprising, before the routing step, a step of transforming the packet by adding said secondary address to the packet, and routing the packet based on said secondary destination address.

Claim 4 (previously presented): The routing method according to claim 1, wherein the at least one identifier is a route identifier specific to said destination equipment and the packet is routed based on said specific route identifier.

Claim 5 (currently amended): A device for routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary

destination address and a destination port number, wherein said device comprises, on reception of said packet, means for:

· determining a port mask [[to be]] assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· routing the packet to the destination equipment based on said identifier.

Claim 6 (currently amended): Telecommunications network equipment adapted to receive an IP data packet comprising a primary destination address and a destination port number, comprising at least one routing device comprising means for:

· determining a port mask [[to be]] assigned to a destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask; and

· routing the packet to the destination equipment based on said identifier.

Claim 7 (previously presented): A method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

Claim 8 (previously presented): The method according to claim 7 of configuring a piece of terminal equipment, comprising a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address

as the destination address to said piece of terminal equipment, and the configuration message further comprising said routing device identifier.

Claim 9 (previously presented): The configuration method according to claim 7, wherein said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address.

Claim 10 (previously presented): A configuration server in a telecommunications network, wherein, on reception of a configuration request sent by a piece of terminal equipment, comprises means for:

· assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

Claim 11 (previously presented): A method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

Claim 12 (previously presented): The configuration method according to claim 11, wherein, once an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device.

Claim 13 (previously presented): The configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.

Claim 14 (previously presented): A piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to the piece of client terminal equipment, and a routing identifier, the piece of client terminal equipment comprising means for:

· storing said configuration data;

· before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number.

Claim 15 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the routing method according to claim 1.

Claim 16 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the configuration method according to claim 7.

Claim 17 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the method according to claim 11.

## REMARKS

The following remarks are responsive to the Final Office Action of March 1, 2013.

At the time of the Final Office Action, claims 1–17 were pending. The status of the claims is as follows:

- Claims 1–6 and 15 were rejected under 35 U.S.C. § 102(e) as being anticipated by Parker (U.S. Patent Application Publication No. 2007/0153808); and
- Claims 7–14, 16, and 17 were rejected under 35 U.S.C. §103(a) as being obvious over Parker in view of Baum (U.S. Patent Application Publication No. 2011/0067119).

Applicant herein amends claims 1, 5, and 6 to improve form. No new matter has been added. Applicant presents discussion below distinguishing the claims from the art cited against them.

### 35 U.S.C. § 102(e) Rejection of Claims 1–6 and 15 by Parker

*1. Applicant respectfully asserts that Parker fails to disclose, teach, or suggest "primary destination address," "destination port number," or "identifier of destination equipment" as recited in independent claim 1.*

In the Final Office Action, independent claim 1 was rejected "under 35 U.S.C. § 103(a) as being anticipated [by] Parker." Final Office Action, p. 2. However, since the Final Office Action cited the language of § 102(e), Applicant presumes that claim 1 was rejected under § 102(e), not § 103(a). As shown in the table below, the Final Office Action equated various terms in Parker with the various terms recited in claim 1:

| **PARKER** | **CLAIM 1** |
|---|---|
| VLAN field | primary destination address |
| ingress port number | destination port number |
| virtual router identifier | identifier of destination equipment |

In response, Applicant respectfully asserts that the terms disclosed in Parker cannot be interpreted as the limitations of claim 1, and accordingly, Parker fails to disclose, teach, or

suggest a "primary destination address," a "destination port number," or an "identifier of destination equipment" as recited in claim 1.

Parker's invention belongs to the technical field of routing of data packets, and more precisely to the field of virtual routers. As Parker explains in paragraph [0005], in this field, "the same physical device appears as a plurality of different virtual routers," and "[t]o implement this capability, current routers directly map a packet field of interest, typically the VLAN field, into the identifier of a particular routing table, and then use the particular routing table to route the packet." The number of different routing tables resulting from this state of the art mapping is thus limited by the size of the VLAN field, and according to Parker, may be insufficient for certain applications. Parker, ¶ [0007]. To solve this problem, Parker discloses a method including the following steps: receiving an incoming packet having a VLAN field and at least one additional field; forming a key from the VLAN field and at least one additional packet field; mapping the key into a virtual router identifier using an indirection mapping process, the virtual router identifier identifying a particular virtual router configuration from a plurality of possible virtual router configurations; configuring the device to have the particular configuration identified by the virtual router identifier; and forwarding the packet with the configured device. Parker, claim 1.

However, Parker fails to disclose, teach, or suggest a "primary destination address," a "secondary destination address," a "destination port number," or an "identifier of destination equipment" as recited in claim 1. First, Parker's VLAN field cannot be equated to claim 1's "primary destination address." According to Parker, the VLAN field is used to identify a particular virtual router configuration from a plurality of possible virtual router configurations. Parker, ¶¶ [0005] & [0022]. In contrast, claim 1 recites "a method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address." Thus, the "destination equipment" recited in claim 1 is necessarily distinct from the router implementing the method. Consequently, a "primary destination address"—the address of a particular destination equipment—cannot be reasonably read as a particular virtual router configuration. Thus, the VLAN field disclosed in Parker is not the "primary destination address" as recited in claim 1.

Second, the "ingress port number" taught by Parker is distinct from the "destination port number" as recited in claim 1. Here, the Final Office Action confuses the two technical

meanings of the word "port"—physical interface vs. software construct—which were discussed in the previous Response in reference to Baum and Patek. The "port" in Parker is a physical interface belonging to a routing device. Parker, ¶ [0024]. In the instant application, a "port" is an interface belonging to a destination equipment, which is an "application-specific or process-specific software construct serving as communications endpoints in a computer's host operating system." Port (computer networking), http://en.wikipedia.org/wiki/Port_(computer_networking) (emphasis added). Accordingly, one of ordinary skill in the art would not confuse a physical "ingress port" in a router (according to Parker) with as a "port" assigned to a destination equipment distinct from the router (recited in claim 1). Therefore, the "ingress port number" taught in Parker is distinguishable from the "destination port number" as recited in claim 1.

Finally, Parker's "virtual router identifier" is not the "identifier of the destination equipment" as recited in claim 1. According to Parker, the "identifier of a virtual router" identifies a particular virtual router configuration. Parker, ¶ [0012] & [0025]. Since the virtual router in Parker is distinct from the "destination equipment" as recited in claim 1, the identifier of a virtual router" cannot be read as an "identifier of a destination equipment" required by claim 1 (emphasis added).

For at least the foregoing reasons, Applicant respectfully asserts that Parker fails to disclose, teach, or suggest all the limitations of independent claim 1 and thus cannot anticipate independent claim 1. Since independent claims 5 and 6 recite limitations similar to claim 1, claims 5 and 6 are also not anticipated by Parker for at least the same reasons. By virtue of their dependence from claim 1, claims 2–4 and 15 are also not anticipated by Parker. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 102(e) be withdrawn and that claims 1–6 and 15 be allowed.

*2. In addition to the argument presented above with respect to independent claim 1, Applicant respectfully asserts that Parker also fails to disclose, teach, or suggest a "secondary destination address" as recited in claim 2.*

The Final Office Action equated Parker's VMAN field with the "secondary destination address" as recited in claim 1. Final Office Action, p. 3. In addition to the argument presented

above with respect to claim 1, Applicant respectfully asserts that Parker's VMAN field cannot be interpreted as the "secondary destination address" as recited in claim 2.

According to Parker, several VLAN values are associated to a single VMAN value: "the VLAN terminology is now primarily used to uniquely identify logically related end user equipment within a VMAN." Parker, ¶ [0023]. On the contrary, in claim 2, several secondary (destination) addresses are associated with a single primary (destination) address. Since Parker does not disclose that several VMAN fields are associated with a single VLAN field, Parker's VMAN field cannot be equated to the "secondary destination address" as recited in claim 2.

For at least these reasons, Applicant respectfully asserts that Parker fails to disclose, teach, or suggest all the limitations of dependent claim 2 and thus cannot anticipate claim 2. Accordingly, Applicant respectfully requests that the rejection under 35 U.S.C. § 102(e) be withdrawn and that dependent claim 2 be allowed.

**35 U.S.C. § 103(a) Rejection of Claims 7–14, 16, and 17 over Parker in view of Baum**

*3. Applicant respectfully asserts that claims 7–14, 16, and 17 are novel and non-obvious over Parker in view of Baum for at least the reasons presented above with respect to claims 1 and 2, since Baum cannot cure the deficiencies found in Parker.*

The Final Office Action rejected claims 7–14, 16, and 17 over Parker in view of Baum. Final Office Action, pp. 6–15. Without addressing the specifics of the Baum reference on the merits, Applicant relies upon the above arguments and asserts that the disclosure of Baum does not cure the deficiencies found in the teaching of Parker.

For at least these reasons, Applicant respectfully asserts that claims 7–14, 16, and 17 are novel and non-obvious over the art of record, and respectfully requests that the rejection under 35 U.S.C. § 103(a) be withdrawn and that claims 7–14, 16, and 17 be allowed.

**Conclusion**

In view of the foregoing amendments and remarks, the application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/brian c. rupp/

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Date: April 30, 2013

CH01/ 26134679.2

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 15648439 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
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| **Attorney Docket Number:** | P3594US |
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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P3594US_Response_to_Final_Office_Action.pdf | 131228<br>052145a5ba4ee8e1ced2137200c71d4b412d7bdd | yes | 10 |

| | Multipart Description/PDF files in .zip description | | |
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| | **Document Description** | **Start** | **End** |
| | Amendment After Final | 1 | 1 |
| | Claims | 2 | 5 |
| | Applicant Arguments/Remarks Made in an Amendment | 6 | 10 |
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| PATENT APPLICATION FEE DETERMINATION RECORD<br>Substitute for Form PTO-875 | Application or Docket Number<br>12/935,040 | Filing Date<br>09/28/2010 | ☐ To be Mailed |
|---|---|---|---|

**ENTITY:** ☒ LARGE ☐ SMALL ☐ MICRO

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | RATE ($) | FEE ($) |
|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| AMENDMENT | 04/30/2013 | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * 17 | Minus | ** 20 | = 0 | X $80 = | 0 |
| | Independent (37 CFR 1.16(h)) | * 7 | Minus | ***7 | = 0 | X $420 = | 0 |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | 0 |

| AMENDMENT | | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|
| | Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | |
| | Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | |
| | ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | |
| | ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | |
| | | | | | | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/PARTHENIA D. MERRILL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

8968 7590 03/01/2013

DRINKER BIDDLE & REATH LLP
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191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

| EXAMINER | |
|---|---|
| BELUR, DEEPA | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2472 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 03/01/2013 | ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DBRIPDocket@dbr.com
IPDockets@dbr.com

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 12/935,040 | BOUCADAIR, MOHAMED | |
| | Examiner | Art Unit | |
| | DEEPA BELUR | 2472 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 November 2012*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

5)☒ Claim(s) *1-17* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-17* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *28 November 2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

## DETAILED ACTION

1. This action is in response to the application filed on November 28, 2012.

2. Claims 1-17 have been submitted for examination.

3. Claims 1-17 have been examined and rejected.

### *Claim Rejections - 35 USC § 102*

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-6, 15 are rejected under 35 U.S.C. 103(a) as being anticipated Parker (US20070153808A1).

**Regarding Claim 1,** Parker discloses a method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, said method comprising, on reception of said packet (see column 2, lines 11-14, the method begins when a packet is received having a VLAN field/primary destination address and another field/ingress port number; see column 3, lines 40-41, FIG. 1, ingress port 110 is an identifier of the physical port on which the packet was received at the device/destination port number, to form a key at block 112. The key is mapped into a virtual router identifier that identifies a particular router configuration from a plurality of possible virtual router configurations/destination equipment) the following steps:

- determining a port mask to be assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs (see FIG. 3, block 302 for Key Generation, see column 6, lines 5-6, the key generation step is performed by the logic 112 in FIG 1 with VLAN filed/primary destination address and another field/port number, to form a key. The next step 304 performs a masking process performed by logic 112 in FIG.1 resulting in the virtual router indirection map 120/indicating the actual port number to which the destination belongs);

• selecting at least one identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask (see FIG. 3, block 308, Output Virtual Router Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier. As shown in FIG. 3, this is performed after masking/based on the key formed with the primary destination address and port mask); and

• routing the packet to the destination equipment based said identifier (see FIG. 3, steps 310 and 312, see column 6, lines 30-31 and lines 44-45; the device is configured to have the particular configuration identified by the virtual router identifier, and forwarding/routing, the packet in accordance with the configured device/routing the packet to the destination equipment based on the identifier).

**Regarding Claim 2,** Parker discloses the method according to claim 1 of routing an IP data packet, wherein said at least one identifier is a secondary destination address of the destination equipment (see FIG. 2A, VMAN field/secondary destination address, which is in the key that is formed by the ingress parser, which parses the received packet as shown in FIG. 1).

**Regarding Claim 3,** Parker discloses the method according to claim 2 of routing an IP data packet, comprising, before the routing step, a step of transforming the packet by adding said secondary address to the packet, and routing the packet based on said secondary destination address (see FIG. 2A, VMAN field/secondary destination address, which is in the key that is formed by the ingress parser, which parses the received packet as shown in FIG. 1/parses to include the VMAN field/secondary address, so that the packet is routed to an uniquely identified end user equipment within the VMAN – see column 3, lines 34-36).

**Regarding Claim 4,** Parker discloses the routing method according to claim 1, wherein the at least one identifier is a route identifier specific to said destination equipment and the packet is routed based on said specific route identifier (see FIG. 3, block 308, Output Virtual Router

Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier. As shown in FIG. 3, this is performed after masking/based on the key formed with the primary destination address and port mask).

**Regarding Claim 5,** Parker discloses a device (see FIG. 1, networking device for routing), for routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, wherein said device comprises, on reception of said packet (see column 2, lines 11-14, the method begins when a packet is received having a VLAN filed/primary destination address and another field/ingress port number 110 is an identifier of the physical port on which the packet was received at the device/destination port number, to form a key. The key is mapped into a virtual router identifier that identifies a particular router configuration from a plurality of possible virtual router configurations/destination equipment), means for:

- determining a port mask to be assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs (see FIG. 3, block 302 for Key Generation, see column 6, lines 5-6, the key generation step is performed by the logic 112 in FIG 1 with VLAN filed/primary destination address and another field/port number, to form a key. The next step 304 performs a masking process performed by logic 112 in FIG.1 resulting in the virtual router indirection map 120/indicating the actual port number to which the destination belongs);
- selecting an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask (see FIG. 3, block 308, Output Virtual Router Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier. As shown in FIG. 3, this is performed after masking/based on the key formed with the primary destination address and port mask); and
- routing the packet to the destination equipment based said identifier (see FIG. 3, steps 310 and 312, see column 6, lines 30-31 and lines 44-45; the device is configured to have

the particular configuration identified by the virtual router identifier, and forwarding/routing, the packet in accordance with the configured device/ routing the packet to the destination equipment based on the identifier).

**Regarding Claim 6,** Parker discloses Telecommunications network equipment (see FIG. 4 router architecture with interfaces connecting to the telecommunications network) adapted to receive an IP data packet comprising a primary destination address and a destination port number, comprising at least one routing device comprising (see column 2, lines 11-14, the method begins when a packet is received having a VLAN filed/primary destination address and another field/ingress port number 110 is an identifier of the physical port on which the packet was received at the device/destination port number, to form a key. The key is mapped into a virtual router identifier that identifies a particular router configuration from a plurality of possible virtual router configurations/destination equipment) means for:

• determining a port mask to be assigned to a destination equipment, the port mask defining a range of port numbers to which the destination port number belongs (see FIG. 3, block 302 for Key Generation, see column 6, lines 5-6, the key generation step is performed by the logic 112 in FIG 1 with VLAN filed/primary destination address and another field/port number, to form a key. The next step 304 performs a masking process performed by logic 112 in FIG.1 resulting in the virtual router indirection map 120/indicating the actual port number to which the destination belongs);

• selecting an identifier of the destination equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on the port mask (see FIG. 3, block 308, Output Virtual Router Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier. As shown in FIG. 3, this is performed after masking/based on the key formed with the primary destination address and port mask); and

• routing the packet to the destination equipment based on said identifier (see FIG. 3, steps 310 and 312, see column 6, lines 30-31 and lines 44-45; the device is configured to

have the particular configuration identified by the virtual router identifier, and forwarding/routing, the packet in accordance with the configured device/ routing the packet to the destination equipment based on the identifier).

**Regarding Claim 15,** Parker discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the routing method according to claim 1 (see column 6, lines 47-53).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**5.** Claims 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Parker (US20070153808A1) in view of Baum (US20110067119A1)

**Regarding Claim 7,** Parker discloses a method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment (see FIG. 4, the packet classification/forwarding system 402 has an ingress port 406 and an egress port 408 through which network side packets may respectively enter/reception side, and exit) the following steps:

• assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment (see FIG. 4 the packet parser 104 generates the key (comprising primary address) and sends it to the packet processor, also see column 2, lines 11-14, the method begins when a packet is received having a VLAN filed/primary destination address and another field/ingress port number 110 is an identifier of the physical port on which the packet was received at the device/destination port number, to form a key.);

• assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier (see FIG. 3, block 308, Output Virtual Router Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier); and

• sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier (see FIG. 3 block 310, which gets information from the key generated comprising the port number and primary destination address, followed by masking and providing a virtual identifier).

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

sending a configuration message comprising said primary address, said port mask, and said routing identifier

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

sending a configuration message comprising said primary address, said port mask, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is returned to the device/ sending to said piece of terminal equipment a configuration message. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 8,** Parker discloses the method according to claim 7 of configuring a piece of terminal equipment, comprising a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet comprising said primary address as the destination address to said piece of terminal equipment (see FIG. 6A, key type 606 with just the VLAN/primary address. When a key is formed with just this field, it becomes the destination address of the terminal equipment), and the configuration message further comprising said routing device identifier.

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

the configuration message comprising said primary address, said port mask, and said routing identifier

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

the configuration message comprising said primary address, said port mask, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is returned to the device/ sending to said piece of terminal equipment a configuration message. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 9,** Parker discloses the configuration method according to claim 7, wherein said configuration message is further sent to a routing device that routes to said piece of

terminal equipment a data packet containing said primary address as the destination address (see FIG. 6A, key type 606 with just the VLAN/primary address. When a key is formed with just this field, it becomes the destination address of the terminal equipment).

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

> said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address.

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

> said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is returned to the device/ sending to said piece of terminal equipment a configuration message. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 10,** Parker discloses a configuration server in a telecommunications network (see FIG. 4 router architecture with interfaces connecting to the telecommunications network/server), wherein, on reception of a configuration request sent by a piece of terminal equipment (see FIG. 4, the packet classification/forwarding system 402 has an ingress port

406 and an egress port 408 through which network side packets may respectively enter/reception side, and exit), comprises means for:

• assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment (see FIG. 4 the packet parser 104 generates the key (comprising primary address) and sends it to the packet processor, also see column 2, lines 11-14, the method begins when a packet is received having a VLAN filed/primary destination address and another field/ingress port number 110 is an identifier of the physical port on which the packet was received at the device/destination port number, to form a key);

• assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier (see FIG. 3, block 308, Output Virtual Router Identifier/selecting one identifier of the destination equipment, see column 6, lines 20-21, step 308 comprises outputting the virtual router identifier); and

• sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier (see FIG. 3 block 310, which gets information from the key generated comprising the port number and primary destination address, followed by masking and providing a virtual identifier)

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

sending a configuration message comprising said primary address, said port mask, and said routing identifier

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

sending a configuration message comprising said primary address, said port mask, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is returned to the device/ sending to said piece of

terminal equipment a configuration message. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 11,** Parker discloses a method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:

• storing said configuration data (see column 4, lines 57-60, also see FIG. 1, store element 124,the matching entries are mapped into the virtual router identifier 102 using a data store element having a plurality of entries/configuration data); and

• before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number (see FIG. 3, block 302 for Key Generation, see column 6, lines 5-6, the key generation step is performed by the logic 112 in FIG 1 with VLAN filed/primary destination address and another field/port number, to form a key. The next step 304 performs a masking process performed by logic 112 in FIG.1 resulting in the virtual router indirection map 120/indicating the actual port number to which the destination belongs)

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

receiving a configuration message comprising said primary address, said port mask, and said routing identifier

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

receiving a configuration message comprising said primary address, said port mask, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is received by the device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 12,** Parker discloses the configuration method according to claim 11, wherein, once an identifier of a routing device adapted to route a data packet comprising said primary

address as the destination address to said piece of terminal equipment has been received (see FIG. 6A, key type 606 with just the VLAN/primary address. When a key is formed with just this field, it becomes the destination address of the terminal equipment), said method further comprises a step of sending the configuration data to said routing device.

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

sending a configuration data to said routing device

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

sending a configuration data to said routing device (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is returned to the device/sending to said piece of terminal equipment a configuration data. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration data, to the requesting device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 13,** Parker discloses the configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative.

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

a step of verifying that the port number belongs to the range of port numbers defined by the port mask, and a step of rejecting said packet if result of the verification is negative (see page 2, paragraph 0018, when a network is defined by an IP address and a subnet mask is used by the routers to distinguish

between the host portion and the rest of the IP address thereby allowing routing within the network based on the subnet portion of the address/rejecting said packet if the result of verification is negative).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 14,** Parker discloses a piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to the piece of client terminal equipment, and a routing identifier, the piece of client terminal equipment comprising means for:

• storing said configuration data (see column 4, lines 57-60, also see FIG. 1, store element 124,the matching entries are mapped into the virtual router identifier 102 using a data store element having a plurality of entries/configuration data);

• before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number (see FIG. 3, block 302 for Key Generation, see column 6, lines 5-6, the key generation step is performed by the logic 112 in FIG 1 with VLAN filed/primary destination address and another field/port number, to form a key. The next step 304 performs a masking process performed by logic 112 in FIG.1 resulting in the

virtual router indirection map 120/indicating the actual port number to which the destination belongs)

Although Parker teaches presenting different virtual routers to end users, it does not explicitly disclose:

receiving a configuration message comprising said primary address, said port mask, and said routing identifier

However, Baum teaches reliable way of determining physical location information of a device, it further discloses:

receiving a configuration message comprising said primary address, said port mask, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, corresponding to the received IP address/primary address, is received by the device).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the technique of Baum, the motivation being it would teach Parker, a reliable way of determining physical location information of a device using an IP address which may have been dynamically assigned, and the use of security applications that need accurate device location information (see page 4, paragraph 0042).

**Regarding Claim 16,** Parker discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the configuration method according to claim 7 (see column 6, lines 47-53).

**Regarding Claim 17,** Parker discloses a non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the method according to claim 11 (see column 6, lines 47-53).

***Response to Arguments***

Applicant's arguments with respect to claims 1-17 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEEPA BELUR whose telephone number is (571)270-3722. The examiner can normally be reached on Monday-Friday 8:30am to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. B./
Deepa Belur
Examiner, Art Unit 2472

/Hassan Kizou/
Supervisory Patent Examiner, Art Unit 2472

| Notice of References Cited | Application/Control No. 12/935,040 | Applicant(s)/Patent Under Reexamination BOUCADAIR, MOHAMED | |
|---|---|---|---|
| | Examiner DEEPA BELUR | Art Unit 2472 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-7,894,451 B2 | 02-2011 | Parker et al. | 370/395.32 |
| * | B | US-2011/0067119 A1 | 03-2011 | Baum, Robert T. | 726/34 |
| * | C | US-7,751,339 B2 | 07-2010 | Melton et al. | 370/252 |
| * | D | US-7,986,670 B2 | 07-2011 | Babbar et al. | 370/331 |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
| | O | | | | | |
| | P | | | | | |
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| | R | | | | | |
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| | T | | | | | |

**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | **Examiner** | **Art Unit** |
| | DEEPA BELUR | 2472 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 08/24/2012 | 02/22/2013 | | | | | | | |
| | 1 | ✓ | ✓ | | | | | | | |
| | 2 | ✓ | ✓ | | | | | | | |
| | 3 | ✓ | ✓ | | | | | | | |
| | 4 | ✓ | ✓ | | | | | | | |
| | 5 | ✓ | ✓ | | | | | | | |
| | 6 | ✓ | ✓ | | | | | | | |
| | 7 | ✓ | ✓ | | | | | | | |
| | 8 | ✓ | ✓ | | | | | | | |
| | 9 | ✓ | ✓ | | | | | | | |
| | 10 | ✓ | ✓ | | | | | | | |
| | 11 | ✓ | ✓ | | | | | | | |
| | 12 | ✓ | ✓ | | | | | | | |
| | 13 | ✓ | ✓ | | | | | | | |
| | 14 | ✓ | ✓ | | | | | | | |
| | 15 | ✓ | ✓ | | | | | | | |
| | 16 | ✓ | ✓ | | | | | | | |
| | 17 | ✓ | ✓ | | | | | | | |

**EAST Search History** /D.B./ /D.B./

**EAST Search History (Prior Art)**

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S1 | 15 | ((MOHAMED) near2 (BOUCADAIR)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2012/08/21 09:41 |
| S2 | 18 | ((MOHAMED) near2 (BOUCADAIR)).INV. | EPO; JPO; DERWENT | OR | ON | 2012/08/21 09:42 |
| S3 | 10702 | (france adj telecom).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S4 | 566 | routing and S3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S5 | 9991 | routing with (destination adj (address port)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S6 | 26 | S3 and S5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S7 | 1 | "12935040" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 12:53 |
| S8 | 5 | "7320027" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 14:27 |
| S9 | 1 | (assign with (primary adj address)) same5 ((routing adj identifier) and (port adj (mask number))) | US-PGPUB; USPAT; USOCR; | OR | ON | 2012/08/21 16:00 |

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|---|---|---|---|---|---|---|
| | | | FPRS; EPO; JPO; DERWENT; IBM_TDB | | | |
| S10 | 35 | (routing adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:01 |
| S11 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:28 |
| S12 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S13 | 6 | S11 and S12 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S14 | 3048 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S15 | 5 | S11 and S14 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S16 | 2035277 | rout$3 with4 destination | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:17 |
| S17 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S18 | 4037 | S17 and S16 | US-PGPUB; | OR | ON | 2012/08/22 |

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|---|---|---|---|---|---|---|
| | | | USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | | | 09:18 |
| S19 | 333179 | (allocat$3 assign$3) same2 (address (port adj number$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:21 |
| S20 | 1713 | S18 and S19 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:22 |
| S22 | 220 | (primary adj address) and ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:25 |
| S24 | 155303 | (primary adj address) with3 ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S25 | 152 | S20 and S24 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S26 | 6 | "7751339" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:27 |
| S27 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:19 |
| S28 | 11 | "60455353" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; | OR | ON | 2012/08/22 17:45 |

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|---|---|---|---|---|---|---|
| | | | IBM_TDB | | | |
| S29 | 8356 | (port adj number) near2 (destination terminal (end adj point)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:31 |
| S30 | 9390 | (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:34 |
| S31 | 214176 | "370".clas. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S32 | 4352 | S30 and S31 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:36 |
| S33 | 584 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:37 |
| S34 | 294 | S31 and S33 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 13:38 |
| S35 | 1 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) with (port adj mask) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:02 |
| S36 | 3 | "20090219834" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 15:06 |
| S37 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment)) | US-PGPUB; USPAT; USOCR; FPRS; | OR | ON | 2013/02/21 15:12 |

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|---|---|---|---|---|---|---|
| | | with (mask$3) | EPO; JPO; DERWENT; IBM_TDB | | | |
| S38 | 3205 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:48 |
| S39 | 7 | S38 and S33 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:49 |
| S40 | 4 | (rout$3 transfer$4 transport$3 transmit$4) near2 (port adj number) near2 (destination terminal (end adj point) client (terminal adj equipment) user$1) with (mask$3) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/21 17:56 |
| S48 | 384 | (rout$3 transfer$4 transport$3 transmit$4) with (port adj number) near2 ((primary destination terminal (end adj point) client (terminal adj equipment) user$1) adj (address)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:11 |
| S50 | 6 | S48 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:12 |
| S51 | 415 | (rout$3 transfer$4 transport$3 transmit$4) with mask$3 near2 identif$3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:23 |
| S52 | 4 | S51 and S42 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2013/02/22 09:24 |
| S53 | 109 | ("20010005876" \| "20010015976" \| "20010025315" \| "20010028651" \| "20010048661" \| "20020184387" \| "20020191605" \| "20030005210" \| "20030026259" \| "20030028713" \| "20030069973" \| "20030154380" \| "20030165144" \| "20030169612" \| "20030193949" \| "20040003110" \| "20040015683" \| "20040100956" \| | US-PGPUB; USPAT; USOCR | OR | ON | 2013/02/22 10:03 |

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| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | Examiner | Art Unit |
| | DEEPA BELUR | 2472 |

| CPC- SEARCHED | | |
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| Class | Subclass | Date | Examiner |
| 370 | 254, 351 | 8/21/2012 | DB |
| ABOVE | UPDATED | 2/21/2013 | DB |

| SEARCH NOTES | | |
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| Search Notes | Date | Examiner |
| 370/254, 351 (text search only - see search history printout) | 8/21/2012 | DB |
| EAST (USPAT, USPGPUB, EPO, USOCR, FERS, JPO, DERWENT, IBM_TDB) - see search history printout | 8/21/2012 | DB |
| Inventor and assignee search in EAST - see search history printout | 8/21/2012 | DB |

| INTERFERENCE SEARCH | | | |
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| US Class/ CPC Symbol | US Subclass / CPC Group | Date | Examiner |
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| /D.B./<br>Examiner.Art Unit 2472 | |

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: 2472

Application No. 12/935,040

Examiner: Deepa Belur

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**RESPONSE TO OFFICE ACTION OF AUGUST 31, 2012**

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Madam:

In response to the Office Action of August 31, 2012, please enter the following amendments and consider the following remarks:

**Amendments to the Claims** are provided in a listing of claims, which begins on page 2 of this paper.

**Remarks** begin on page 7 of this paper.

**Listing of Claims**

This listing of claims will replace all prior versions and listings of claims in the application.

Claim 1 (currently amended): A method of routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary destination address and a destination port number, said method comprising, on reception of said packet, the following steps:

· determining a port mask to be assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting [[an]] at least one identifier of [[a]] the destination ~~piece of~~ equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on ~~the basis of~~ the port mask; and

· routing the packet to the destination equipment based on ~~the basis of~~ said identifier.

Claim 2 (currently amended): The method according to claim 1 of routing an IP data packet, wherein said at least one identifier is a secondary destination address of the destination ~~piece of~~ equipment.

Claim 3 (currently amended): The method according to claim 2 of routing an IP data packet, comprising, before the routing step, a step of transforming the packet ~~to add to it~~ by adding said secondary address to the packet, and routing the packet ~~is routed on the basis of~~ based on said secondary destination address.

Claim 4 (currently amended): The routing method according to claim 1, wherein the at least one identifier is a route identifier specific to said ~~pieces of~~ destination equipment and the packet is routed based on ~~the basis of~~ said specific route identifier.

Claim 5 (currently amended): A device for routing an IP data packet in a telecommunications network to a destination equipment, said packet comprising a primary

destination address and a destination port number, wherein said device comprises, on reception of said packet, means for:

· determining a port mask to be assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of [[a]] the destination ~~piece of~~ equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on ~~the basis of~~ the port mask; and

· routing the packet to the destination equipment based on ~~the basis of~~ said identifier.

Claim 6 (currently amended): Telecommunications network equipment adapted to receive an IP data packet comprising a primary destination address and a destination port number, comprising at least one routing device comprising means for:

· determining a port mask to be assigned to a destination equipment, the port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of [[a]] the destination ~~piece of~~ equipment of the packet from a plurality of equipment identifiers associated with said primary destination address based on ~~the basis of~~ the port mask; and

· routing the packet to the destination equipment based on ~~the basis of~~ said identifier.

Claim 7 (previously presented): A method of configuring a piece of terminal equipment connected to a telecommunications network, comprising, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message comprising said primary address, said port mask, and said routing identifier.

Claim 8 (currently amended): The method according to claim 7 of configuring a piece of terminal equipment, comprising a step of assigning to said piece of terminal equipment an

identifier of a routing device adapted to route a data packet ~~containing~~ comprising said primary address as the destination address to said piece of terminal equipment, and the configuration message further comprising said routing device identifier.

Claim 9 (previously presented): The configuration method according to claim 7, wherein said configuration message is further sent to a routing device that routes to said piece of terminal equipment a data packet containing said primary address as the destination address.

Claim 10 (currently amended): A configuration server in a telecommunications network, wherein, on reception of a configuration request sent by a piece of terminal equipment, comprises means for:

· assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message comprising said ~~public~~ primary address, said port mask, and said routing identifier.

Claim 11 (currently amended): A method of configuring a piece of terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address, a port mask defining a range of port numbers that is dedicated thereto, and a routing identifier, said method comprises the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

Claim 12 (previously presented): The configuration method according to claim 11, wherein, once an identifier of a routing device adapted to route a data packet comprising said primary

address as the destination address to said piece of terminal equipment has been received, said method further comprises a step of sending the configuration data to said routing device.

Claim 13 (currently amended): The configuration method according to claim 11, wherein, on reception of a data packet comprising a destination address, a port number, and a routing identifier, said method further comprises a step of verifying that the port number belongs to the range of port numbers defined by [[its]] the port mask, and a step of rejecting said packet if [[the]] result of the verification is negative.

Claim 14 (currently amended): A piece of client terminal equipment connected to a telecommunications network, wherein, on reception of a configuration message comprising configuration data comprising a primary address shared with a plurality of pieces of terminal equipment, a port mask defining a range of port numbers that is dedicated to [[it]] the piece of client terminal equipment, and a routing identifier, the piece of client terminal equipment comprising [[a]] means for:

· storing said configuration data;

· before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet comprising as source address the primary address of said piece of client terminal equipment and as source port number the selected port number.

Claim 15 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the routing method according to claim 1.

Claim 16 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the configuration method according to claim 7.

Claim 17 (previously presented): A non-transitory computer program product stored on a computer-readable medium and executable by a microprocessor, comprising program code instructions for executing the method according to claim 11.



Juniper Exhibit 1002, page 131

## REMARKS

The following remarks are responsive to the Office Action of August 31, 2012.

At the time of the Office Action, claims 1–17 were pending. The status of the claims is as follows:

- Claims 15–17 were rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter; and
- Claims 1–17 were rejected under 35 U.S.C. § 103(a) as being obvious over Baum (U.S. Patent Application Publication No. 2011/0067119) in view of Patek (U.S. Patent Application Publication No. 2003/0088694).

Applicant herein amends independent claims 1, 5, and 6 to clarify that the "port mask [is] to be assigned to the destination equipment." Claims 2–4, 8, 10, 11, 13, and 14 were amended to improve form. Non-limiting support for the amendments can be found in at least page 14 at line 34 to page 15 at line 13 of the application as filed. No new matter has been added. Applicant presents discussion below distinguishing the claims from the art cited against them.

### 35 U.S.C. § 101 Rejection of Claims 15–17

*1. The Examiner indicated that this rejection will be withdrawn in view of the Preliminary Amendment filed on September 28, 2010.*

Applicant thanks Examiner Deepa Belur for her time and efforts in working with Applicant's representative, Lynn Q. Peng, during the telephone call on November 27, 2012. Examiner Belur indicated that the rejection under 35 U.S.C. § 101 will be withdrawn in view of the Preliminary Amendment filed on September 28, 2010, in which claims 15–17 were amended to recite "non-transitory computer program product."

### 35 U.S.C. § 103(a) Rejection of Claims 1–17 over Baum in view of Patek

*2. Baum in view of Patek cannot render amended independent claim 1 obvious because the references do not disclose, teach, or suggest "said packet comprising a primary destination address and a destination port number" or "determining a port mask to be assigned to the*

*destination terminal, the port mask defining a range of port numbers to which the destination port number belongs" as recited in amended claim 1.*

In the Office Action, independent claim 1 was rejected as being obvious over Baum in view of Patek. Office Action, pp. 3–4. The Office Action cited Baum at paragraph [0082] as disclosing "said packet including a primary destination address and a destination port number" and "defining a range of port numbers to which the destination port number belongs." Office Action, p. 3. While stating that Baum does not disclose "determining a port mask," the Office Action then cited Patek as "using port mask to determine which selected port receive data." Office Action, pp. 3–4.

In response, Applicant herein amends claim 1 to clarify that the "port mask [is] to be assigned to the destination equipment." Applicant respectfully asserts that neither Baum nor Patek discloses, teaches, or suggests a "data packet comprising a destination port number" or "determining a port mask to be assigned to the destination equipment, the port mask defining a range of port numbers to which the destination port number belongs" as recited in claim 1 (emphasis added).

First, the Ethernet frame disclosed in Baum, which has an IP destination address, cannot be equated to a "data packet comprising . . . a destination port number" as required by claim 1 (emphasis added). Baum discloses edge routers that interface between the Ethernet LANs and the IP network, and "the edge routers . . . include routines for responding to requests to identify a router port corresponding to an IP or MAC address supplied as part of a port information request." Baum, ¶ [0082] (emphasis added). In Baum, when an edge router receives an Ethernet frame including an IP destination address, the edge router determines, within the Ethernet LAN, which MAC address is uniquely associated with this IP destination address. Baum, ¶¶ [0034]–[0035]. The edge router then forwards the Ethernet frame to a terminal having this MAC address via the router's output port to which this terminal is connected. Baum, ¶ [0091].

As it is well known in the art, an IP or MAC address is distinct from a port number.[1] Thus, the IP destination address in Baum is not interchangeable with the "port number" recited

[1] The present application uses the ordinary and customary meanings of "port" and "port number." Application, p. 13, ln. 1–p. 14, ln. 11. For a description of "port" and "port number" as well known by one of ordinary skill in the art, see http://en.wikipedia.org/wiki/Port_(computer_networking):

in amended claim 1. Furthermore, while the "ports" discussed in Baum are interfaces of a router, the "ports" disclosed in the present application are interfaces of a destination or terminal equipment. Accordingly, Baum does not disclose, teach, or suggest a "said packet including a primary destination address and a destination port number" or "defining a range of port numbers to which the destination port number belongs" as required by amended claim 1 (emphasis added).

Second, Patek fails to disclose, teach, or suggest "determining a port mask to be assigned to the destination terminal" as recited in amended claim 1. Patek discloses a router for scheduling multicast frames in a switching network. When the router receives an incoming frame including a destination ID associated with a set of multicast destination terminals, the router forwards a copy of this frame to the output ports of the router. Patek, ¶¶ [0006] & [0030]. The "output port mask" in Patek refers to the selection of the router output ports associated with a given destination ID. Patek, ¶ [0006]. Patek's "output port mask" is thus distinct from the "port mask to be assigned to the destination terminal" recited in amended claim 1. Similar to Baum, while the "output ports" discussed in Patek are interfaces of a router, the "ports" disclosed in the present application are interfaces of a destination or terminal equipment. Accordingly, Patek's "output port mask" cannot be interpreted as the "port mask" recited in amended claim 1.

Furthermore, unlike Baum and Patek, amended claim 1 recites "a method of routing an IP data packet in a telecommunications network to a destination terminal." In an embodiment of the instant application, each destination terminal in a network is assigned a port mask defining a range of port numbers dedicated to this destination terminal. Application, p. 8, lns. 5–17. In

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In computer networking a **port** is an application-specific or process-specific software construct serving as a communications endpoint in a computer's host operating system. A port is associated with an IP address of the host, as well as the type of protocol used for communication. In plain English, the purpose of ports is to uniquely identify different applications or processes running on a single computer and thereby enable them to share a single physical connection to a packet-switched network like the Internet.

The protocols that primarily use ports are the Transport Layer protocols, such as the Transmission Control Protocol (TCP) and the User Datagram Protocol (UDP) of the Internet Protocol Suite. **A port is identified for each address and protocol by a 16-bit number, commonly known as the port number.** The port number, added to a computer's IP address, completes the destination address for a communications session. That is, data packets are routed across the network to a specific destination IP address, and then, upon reaching the destination computer, are further routed to the specific process bound to the destination port number.

other words, each destination terminal is uniquely associated with a respective set of port numbers, usually comprising a plurality of port numbers. According to another embodiment, when a router receives a data packet including a primary destination address (e.g., a public IP address) and a destination port number, the router determines, within the network associated with this primary destination address, which destination terminal is associated with this destination port number (one of an associated set of port numbers), and forwards the data packet to this destination terminal. Application, p. 13, ln. 8–p. 14, ln. 12.

For at least the foregoing reasons, Applicant assert that Baum in view of Patek fails to disclose, teach, or suggest all the limitations of amended claim 1 and thus cannot render amended claim 1 obvious. Since independent claims 5–7, 10, 11, and 14 recites at least the "port number" and "port mask" limitations of amended claim 1, they are not obvious for at least the same reasons. By virtue of their dependence from claims 1, 7, and 11, claims 2–4, 8, 9, 12, 13, and 15–17 are not obvious for at least the same reasons presented with respect to amended claim 1. Accordingly, Applicant respectfully request that the rejection under 35 U.S.C. § 103(a) be withdrawn and that claims 1–17 be allowed.

**Conclusion**

In view of the foregoing amendments and remarks, the application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/brian c. rupp/

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Customer No.: 08968

Date: November 28, 2012
CH01/ 26058388.2

# Electronic Acknowledgement Receipt

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|---|---|
| **EFS ID:** | 14326841 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 8968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 28-NOV-2012 |
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| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

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## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | | P3594US_Response_to_Office_Action.pdf | 132461<br>46383f4c04f2ee0da2e395bb7329e98091a29497 | yes | 10 |

| | Multipart Description/PDF files in .zip description | | |
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| | **Document Description** | **Start** | **End** |
| | Amendment/Req. Reconsideration-After Non-Final Reject | 1 | 1 |
| | Claims | 2 | 6 |
| | Applicant Arguments/Remarks Made in an Amendment | 7 | 10 |
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# PATENT APPLICATION FEE DETERMINATION RECORD

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| Application or Docket Number | Filing Date | ☒ To be Mailed |
|---|---|---|
| 12/935,040 | 09/28/2010 | |

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY ☐ RATE ($) | SMALL ENTITY ☐ FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY FEE ($) |
|---|---|---|---|---|---|---|---|
| ☐ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | |
| ☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | |
| ☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | |
| TOTAL CLAIMS (37 CFR 1.16(i)) | minus 20 = | * | X $ = | | OR | X $ = | |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | minus 3 = | * | X $ = | | | X $ = | |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | |

## APPLICATION AS AMENDED – PART II

| AMENDMENT 11/28/2012 | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE ($) | SMALL ENTITY ADDITIONAL FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 17 | Minus | ** 20 | = 0 | X $ = | | OR | X $62= | 0 |
| Independent (37 CFR 1.16(h)) | * 7 | Minus | ***7 | = 0 | X $ = | | OR | X $250= | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | 0 |

| AMENDMENT | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) | | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | | OR | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | | OR | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/NICHELE PETERSON/

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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US | 1314 |

8968 7590 08/31/2012

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| EXAMINER | |
|---|---|
| BELUR, DEEPA | |

| ART UNIT | PAPER NUMBER |
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| 2472 | |

| NOTIFICATION DATE | DELIVERY MODE |
|---|---|
| 08/31/2012 | ELECTRONIC |

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The time period for reply, if any, is set in the attached communication.

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| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 12/935,040 | BOUCADAIR, MOHAMED | |
| | Examiner | Art Unit | |
| | DEEPA BELUR | 2472 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

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A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 September 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

5)☒ Claim(s) *1-17* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-17* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *28 September 2010* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. This action is in response to the application filed on September 28, 2010.

2. Claims 1-17 have been submitted for examination.

3. Claims 1-17 have been examined and rejected.

### *Drawings*

4. The drawings filed on September 28, 2010 are accepted.

### *Claim Rejections - 35 USC § 101*

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. Claim 15-17 is rejected under 35 U.S.C. 101 as covering both non-statutory subject matter and statutory subject matter. Claims 15-17 recite computer readable medium with an executable program stored thereon. The broadest reasonable interpretation of a claim drawn to a computer readable storage medium typically covers forms of non-transitory tangible media and transitory propagating signals *per se* in view of the ordinary and customary meaning of computer readable storage media, particularly when the specification is silent. *See* MPEP 2111.01. When the broadest reasonable interpretation of a claim covers a signal *per se*, the claim must be rejected under 35 U.S.C. § 101 as covering non-statutory subject matter. *See In re Nuijten*, 500 F.3d 1346, 1356-57 (Fed. Cir. 2007) (transitory embodiments are not directed to statutory subject matter) and *Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. § 101*, Aug. 24, 2009; p. 2.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious

at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 1-17 are rejected under U.S.C. 103(a) as being unpatentable over Baum (US20110067119A1) in view of Patek (US20030088694A1)

**Regarding Claim 1,** Baum discloses a method of routing an IP data packet in a telecommunications network (see page 6, paragraph 0078, also see FIG. 5, a communication system/telecommunications network, with IP based network/IP data packet), said packet including a primary destination address and a destination port number, characterized in that said method includes, on reception of said packet, the following steps (see page 6, paragraph 0082, the Edge routers extract port information/destination port number, to identifying a router port corresponding to an IP or MAC address/primary destination address, supplied as part of port information request):

- defining a range of port numbers to which the destination port number belongs (see page 6, paragraph 0082, the Edge routers identify a port/destination port number, corresponding to an IP address or MAC address as part of a port information request/from a range of port numbers);
- selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the; and (see page 7, paragraph 0091, the frames received by the router having an associated MAC destination address/Identifier are output/selected, using the port/identifier, corresponding to the destination MAC address)
- routing the packet to the destination equipment on the basis of said identifier (see page 7, paragraph 0091, the frames received by the router having a destination MAC address are output to the port number/routing the packet to the destination).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. determining a port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. determining a port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005)

**Regarding Claim 2,** Baum discloses a method according to claim 1 of routing an IP data packet, characterized in that said at least one identifier is a secondary destination address of the destination piece of equipment (see page 7, paragraph 0091, also see FIG. 7, the frames received by the router corresponding to a destination MAC address, are output/routing the IP data packet, to the port number/secondary destination address of the destination piece of equipment).

**Regarding Claim 3,** Baum discloses a method according to claim 2 of routing an IP data packet, characterized in that the method includes, before the routing step, a step of transforming the packet to add to it said secondary address and the packet is routed on the basis of said secondary address (see page 6, paragraph 0086, each customer record/IP data packet, is correlated/transformed, to a router and port/secondary address, which is assigned to be used by the customer when accessing the IP network/before routing begins).

**Regarding Claim 4,** Baum discloses a routing method according to claim 1, characterized in that the identifier is a route identifier specific to said pieces of equipment and the packet is routed on the basis of said specific route identifier (see page 7, paragraph 0091, the frames received by the router having a MAC address/Identifier are output/routed, using the port number/destination MAC address or specific route identifier).

**Regarding Claim 5,** Baum discloses a device for routing an IP data packet in a telecommunications network (see page 7, paragraph 0088, also see FIG. 6, edge router/device

for routing), said packet including a primary destination address and a destination port number, characterized in that said device is adapted, on reception of said packet (see page 6, paragraph 0082, the Edge routers extract port information/destination port number, to identifying a router port corresponding to an IP or MAC address/primary destination address, supplied as part of port information request), to implement means for:

- defining a range of port numbers to which the destination port number belongs (see page 6, paragraph 0082, the Edge routers identify a port/destination port number, corresponding to an IP address or MAC address as part of a port information request/from a range of port numbers);
- selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the (see page 7, paragraph 0091, the frames received by the router having an associated MAC destination address/Identifier are output/selected, using the port/identifier, corresponding to the destination MAC address); and
- routing the packet to the destination equipment on the basis of said identifier (see page 7, paragraph 0091, the frames received by the router having a destination MAC address are output to the port number/routing the packet to the destination).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. determining a port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. determining a port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the

motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 6,** Baum discloses telecommunications network equipment (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network) adapted to receive an IP data packet including a primary destination address and a destination port number (see page 6, paragraph 0082, the Edge routers extract port information/destination port number, to identifying a router port corresponding to an IP or MAC address/primary destination address, supplied as part of port information request), characterized in that it includes at least one routing device (see page 7, paragraph 0088, also see FIG. 6 and FIG. 5, edge router/device for routing) including means for:

- defining a range of port numbers to which the destination port number belongs (see page 6, paragraph 0082, the Edge routers identify a port/destination port number, corresponding to an IP address or MAC address as part of a port information request/from a range of port numbers);
- selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the (see page 7, paragraph 0091, the frames received by the router having an associated MAC destination address/Identifier are output/selected, using the port/identifier, corresponding to the destination MAC address); and
- routing the packet to the destination equipment on the basis of said identifier (see page 7, paragraph 0091, the frames received by the router having a destination MAC address are output to the port number/routing the packet to the destination).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. determining a port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. determining a port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 7,** Baum discloses a method of configuring a piece of terminal equipment (see page 6, paragraph 0080, LAN 501 includes host devices 208/terminal equipment), connected to a telecommunications network (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network) characterized in that it includes, on reception of a configuration request sent by said equipment (see page 8, paragraph 0101, when a device/equipment, on a LAN needs an IP address, it broadcasts an IP address assignment request/configuration request), the following steps:

- assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment (see page 8, paragraph 0102-0103, the DHCP server assigns the requesting device/terminal, an IP address/DHCP broadcast address which is a public address typically used by a plurality of clients/plurality of pieces of terminal equipment);
- assigning to said piece of terminal equipment a defining a range of numbers dedicated to it and a routing identifier (see page 8, paragraph 0106, Edge router information requests from the LCIS are received by the server via a SMN, and correlating/assigning an edge

router/routing identifier and a MAC address/port number corresponding to the IP address); and

- sending to said piece of terminal equipment a configuration message including said primary address, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, the MAC address, corresponding to the received IP address/primary address, is returned to the device/ sending to said piece of terminal equipment a configuration message. Also see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 8,** Baum discloses a method according to claim 7 of configuring a terminal equipment, characterized in that it includes a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet containing said primary address as the destination address to said piece of terminal equipment (see page 8, paragraph 0106, Edge router information requests from the LCIS are received by the server via a SMN, and correlating/assigning an edge router/routing identifier and a MAC address corresponding to the IP address/primary address as the destination address) and the configuration message further

includes said routing device identifier (see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning relevant information/configuration message, to the requesting device/terminal equipment).

**Regarding Claim 9,** Baum discloses a configuration method according to claim 7, characterized in that said configuration message is further sent to a routing device able to route to said piece of terminal equipment a data packet containing said primary address as the destination address (see page 8, paragraph 0104, when an IP address is assigned to a requesting device, the IP address/primary destination address, and lease time information is communicated back/sent back, to the requesting device by way of the edge router acting as the devices proxy/routing device).

**Regarding Claim 10,** Baum discloses a configuration server in a telecommunications network(see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network), characterized in that, on reception of a configuration request sent by a piece of terminal equipment (see page 8, paragraph 0101, when a device/equipment, on a LAN needs an IP address, it broadcasts an IP address assignment request/configuration request), it is adapted to implement means for:

- assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment (see page 8, paragraph 0102-0103, the DHCP server/configuration server, assigns the requesting device/terminal, an IP address/DHCP broadcast address which is a public address typically used by a plurality of clients/plurality of pieces of terminal equipment);
- assigning to said piece of terminal equipment a defining a range of numbers dedicated to it and a routing identifier (see page 8, paragraph 0106, the DHCP server/configuration server, correlates/assigns, an edge router/routing identifier and a MAC address/port number, corresponding to the IP address); and

- sending to said piece of terminal equipment a configuration message including said public address, and said routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, the MAC address, corresponding to the received IP address/primary address, is returned to the device/sending to said piece of terminal equipment a configuration message. Also see page 7, paragraph 0087, The DHCP server/configuration server along with the LCIS provides information requests and returning relevant information/configuration message, to the requesting device/terminal equipment).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 11,** Baum discloses a method of configuring a piece of terminal equipment (see page 6, paragraph 0080, LAN 501 includes host devices 208/terminal equipment) connected to a telecommunications network (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network), characterized in that, on reception of a configuration message (see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning/reception at device, relevant

information/configuration message, to the requesting device) including configuration data including a primary address, a port mask defining a range of numbers that is dedicated thereto, and a routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, the MAC address, corresponding to the received IP address/primary address, is returned to the device/received at the piece of terminal equipment a configuration message), said method includes the following steps:

- storing said configuration data (see page 8, paragraph 0102, In response to the IP address assignment request, the DHCP server, assigns the requesting device/terminal equipment, an available IP address from the pool. In addition, the server removes the IP address from the pool, and creates a new entry/stores, in the IP address lease information table/using the configuration data); and
- before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the, said data packet including as source address the primary address of said piece of terminal equipment and as source port number the selected port number (see page 8, paragraph 0101, when a device on a LAN needs an IP address so it can access the IP network/ before sending a data packet into the telecommunications network, it broadcasts an IP address assignment request. Using the DHCP protocol, the IP address assignment request includes the MAC address/source address of the device. A new entry is created with the IP address, the router address, and the MAC address to which the data packets will be output using that port/source port number);

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 12,** Baum discloses a configuration method according to claim 11, characterized in that, once an identifier of a routing device adapted to route a data packet including said primary address as the destination address to said piece of terminal equipment has been received, said method further includes a step of sending the configuration data to said routing device (see page 8, paragraph 0103-0104, each entry in the table includes an IP address, edge router address/ identifier of a routing device, and the MAC address/primary address as the destination address to the terminal equipment, and the lease information/configuration data, is communicated back to the edge router/sending configuration data to the router).

**Regarding Claim 13,** Baum discloses a configuration method according to claim 11, characterized in that, on reception of a data packet including a destination address, a port number, and a routing identifier, said method further includes a step of verifying that the port number belongs to the range of numbers defined by its and a step of rejecting said packet if the result of verification is negative (see page 6, paragraph 0082, the edge routers include routines for responding to requests/from the terminal equipment, to identify a router port/verify, corresponding to an IP or MAC address supplied as part of port information request/ port number belongs to the range of numbers. Also see page 2, paragraph 0018, when a network is defined by an IP address and a subnet mask is used by the routers to distinguish between the host portion and the rest of the IP address thereby allowing routing within the network based on the subnet portion of the address/rejecting said packet if the result of verification is negative).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 14,** Baum discloses a piece of client terminal equipment (see page 6, paragraph 0080, LAN 501 includes host devices 208/terminal equipment), connected to a telecommunications network (see page 8, paragraph 0100, also see FIG. 10, the combined equipment consisting of a DHCP Server, Secure Management Network SMN (see FIG. 5), Location and Customer Information Server LCIS (see FIG. 5 and FIG. 11), and one Edge Route 518 (see FIG. 5, FIG. 6) together make up the telecommunications network) characterized in that, on reception of a configuration message (see page 7, paragraph 0087, The LCIS includes routines for responding to information requests and returning/reception at device, relevant information/configuration message, to the requesting device) including configuration data including a primary address with a plurality of pieces of terminal, a defining a range of numbers that is dedicated to it, and a routing identifier (see page 8, paragraph 0106, the information identifying the edge router/routing identifier, the MAC address, corresponding to the received IP address/primary address which is a public address shared by a plurality of devices, is returned to the device/received at the piece of terminal equipment a configuration message), it is adapted to implement the following means:

- storing said configuration data (see page 8, paragraph 0102, In response to the IP address assignment request, the DHCP server, assigns the requesting device/terminal

equipment, an available IP address from the pool. In addition, the server removes the IP address from the pool, and creates a new entry/stores, in the IP address lease information table/using the configuration data);

- before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the, said data packet including as source address the primary address of said piece of terminal equipment and as source port number the selected port number (see page 8, paragraph 0101, when a device on a LAN needs an IP address so it can access the IP network/ before sending a data packet into the telecommunications network, it broadcasts an IP address assignment request. Using the DHCP protocol, the IP address assignment request includes the MAC address/source address of the device. A new entry is created with the IP address, the router address, and the MAC address to which the data packets will be output using that port/source port number).

Although Baum teaches using port numbers, Baum does not explicitly disclose:

a. port mask

However, Patek teaches using port mask to determine which selected ports receive data, it further discloses:

a. port mask (see page 1, paragraph 0006, the output port mask is used to determine which selected output ports receive a concurrent copy of the incoming frame/IP packet)

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to use port mask to route data in a high data rate network environment, the motivation being it would teach Baum to provide simple, but efficient routing of traffic (see Patek, see page 1, paragraph 0005).

**Regarding Claim 15,** Baum discloses a computer program product downloadable from a communications network and/or stored on a computer- readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the

routing method according to claim 1 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

**Regarding Claim 16,** Baum discloses a computer program product downloadable from a communications network and/or stored on a computer- readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the configuration method according to claim 7 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

**Regarding Claim 17,** Baum discloses a computer program product downloadable from a communications network and/or stored on a computer- readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the method according to claim 11 (see page 15, paragraph 0167, the routines used to control the edge router and other devices used in the communication system of the present invention may be implemented as machine-readable instructions stored on a machine-readable medium).

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DEEPA BELUR whose telephone number is (571)270-3722. The examiner can normally be reached on Monday-Friday 8:30am to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571)272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/DB/
DEEPA BELUR
Examiner, Art Unit 2472

/Hassan Kizou/
Supervisory Patent Examiner, Art Unit 2472

| Notice of References Cited | Application/Control No. 12/935,040 | Applicant(s)/Patent Under Reexamination BOUCADAIR, MOHAMED | |
|---|---|---|---|
| | Examiner DEEPA BELUR | Art Unit 2472 | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Name | Classification |
|---|---|---|---|---|---|
| * | A | US-2011/0067119 A1 | 03-2011 | Baum, Robert T. | 726/34 |
| * | B | US-2003/0088694 A1 | 05-2003 | Patek et al. | 709/238 |
| | C | US- | | | |
| | D | US- | | | |
| | E | US- | | | |
| | F | US- | | | |
| | G | US- | | | |
| | H | US- | | | |
| | I | US- | | | |
| | J | US- | | | |
| | K | US- | | | |
| | L | US- | | | |
| | M | US- | | | |

**FOREIGN PATENT DOCUMENTS**

| * | | Document Number Country Code-Number-Kind Code | Date MM-YYYY | Country | Name | Classification |
|---|---|---|---|---|---|---|
| | N | | | | | |
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| | P | | | | | |
| | Q | | | | | |
| | R | | | | | |
| | S | | | | | |
| | T | | | | | |

**NON-PATENT DOCUMENTS**

| * | | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
| | U | |
| | V | |
| | W | |
| | X | |

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

| Index of Claims | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | Examiner | Art Unit |
| | DEEPA BELUR | 2472 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ✓ | Rejected | - | Cancelled | N | Non-Elected | A | Appeal |
| = | Allowed | ÷ | Restricted | I | Interference | O | Objected |

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

| CLAIM | | DATE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Final | Original | 08/24/2012 | | | | | | | | |
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| | 13 | ✓ | | | | | | | | |
| | 14 | ✓ | | | | | | | | |
| | 15 | ✓ | | | | | | | | |
| | 16 | ✓ | | | | | | | | |
| | 17 | ✓ | | | | | | | | |

| Search Notes | Application/Control No. | Applicant(s)/Patent Under Reexamination |
|---|---|---|
| | 12935040 | BOUCADAIR, MOHAMED |
| | Examiner | Art Unit |
| | DEEPA BELUR | 2472 |

## SEARCHED

| Class | Subclass | Date | Examiner |
|---|---|---|---|
| 370 | 254, 351 | 8/21/2012 | DB |

## SEARCH NOTES

| Search Notes | Date | Examiner |
|---|---|---|
| 370/254, 351 (text search only - see search history printout) | 8/21/2012 | DB |
| EAST (USPAT, USPGPUB, EPO, USOCR, FERS, JPO, DERWENT, IBM_TDB) - see search history printout | 8/21/2012 | DB |
| Inventor and assignee search in EAST - see search history printout | 8/21/2012 | DB |

## INTERFERENCE SEARCH

| Class | Subclass | Date | Examiner |
|---|---|---|---|
| | | | |

| | |
|---|---|
| /DEEPA BELUR/<br>Examiner.Art Unit 2472 | |

**EAST Search History**

**EAST Search History (Prior Art)** /D.B./ /D.B./ /D.B./

| Ref # | Hits | Search Query | DBs | Default Operator | Plurals | Time Stamp |
|---|---|---|---|---|---|---|
| S1 | 15 | ((MOHAMED) near2 (BOUCADAIR)).INV. | US-PGPUB; USPAT; USOCR | OR | ON | 2012/08/21 09:41 |
| S2 | 18 | ((MOHAMED) near2 (BOUCADAIR)).INV. | EPO; JPO; DERWENT | OR | ON | 2012/08/21 09:42 |
| S3 | 10702 | (france adj telecom).as. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S4 | 566 | routing and S3 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:43 |
| S5 | 9991 | routing with (destination adj (address port)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S6 | 26 | S3 and S5 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 09:48 |
| S7 | 1 | "12935040" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 12:53 |
| S8 | 5 | "7320027" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 14:27 |
| S9 | 1 | (assign with (primary adj address)) same5 ((routing adj identifier) and (port adj (mask number))) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:00 |
| S10 | 35 | (routing adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:01 |
| S11 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:28 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S12 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S13 | 6 | S11 and S12 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 16:29 |
| S14 | 3048 | 370/351.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S15 | 5 | S11 and S14 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/21 18:08 |
| S16 | 2035277 | rout$3 with4 destination | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:17 |
| S17 | 4877 | 370/254.ccls. | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S18 | 4037 | S17 and S16 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:18 |
| S19 | 333179 | (allocat$3 assign$3) same2 (address (port adj number$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:21 |
| S20 | 1713 | S18 and S19 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:22 |
| S22 | 220 | (primary adj address) and ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:25 |
| S24 | 155303 | (primary adj address) with3 ((plurality many several) adj (client$s (terminal$1equipment) host$1 user$1)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |
| S25 | 152 | S20 and S24 | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:26 |

| | | | | | | |
|---|---|---|---|---|---|---|
| S26 | 6 | "7751339" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 09:27 |
| S27 | 205 | (rout$3 adj identifier) and (port adj (mask number)) | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:19 |
| S28 | 11 | "60455353" | US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB | OR | ON | 2012/08/22 17:45 |

**8/24/2012 5:25:21 PM**
**C:\Users\dbelur\Documents\EAST\Workspaces\12935040\12935040.wsp**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

# BIB DATA SHEET

**CONFIRMATION NO. 1314**

| SERIAL NUMBER | FILING or 371(c) DATE<br>RULE | CLASS | GROUP ART UNIT | ATTORNEY DOCKET NO. |
|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | 370 | 2472 | P3594US |

**APPLICANTS**
Mohamed Boucadair, Rennes, FRANCE;

**** CONTINUING DATA ***************************
This application is a 371 of PCT/FR09/50548 03/31/2009

**** FOREIGN APPLICATIONS ***************************
FRANCE 0852108 03/31/2008

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
10/19/2010

| Foreign Priority claimed ☑ Yes ☐ No<br>35 USC 119(a-d) conditions met ☑ Yes ☐ No<br>Verified and Acknowledged /DEEPA BELUR/ Examiner's Signature | ☐ Met after Allowance<br>Initials | STATE OR COUNTRY | SHEETS DRAWINGS | TOTAL CLAIMS | INDEPENDENT CLAIMS |
|---|---|---|---|---|---|
| | | FRANCE | 9 | 17 | 7 |

**ADDRESS**

DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606
UNITED STATES

**TITLE**

METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

| FILING FEE RECEIVED | | |
|---|---|---|
| 1860 | FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following: | ☐ All Fees<br>☐ 1.16 Fees (Filing)<br>☐ 1.17 Fees (Processing Ext. of time)<br>☐ 1.18 Fees (Issue)<br>☐ Other _____<br>☐ Credit |

Please type a plus sign (+) inside this box → +

Substitute for form 1449A/B/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

Sheet 1 of 1

| *Complete if Known* | |
|---|---|
| Application Number | Unassigned |
| Filing Date | September 28, 2010 |
| First Named Inventor | Mohamed BOUCADAIR |
| Group Art Unit | Unassigned |
| Examiner Name | Unassigned |
| Attorney Docket Number | P3594US |

**U.S. PATENT DOCUMENTS**

| Examiner Initials | Doc. No. | U.S. Patent Document: Application or Patent Number | U.S. Patent Document: Kind Code | Name of Patentee or Applicant | Date of Publication | Filing Date If Appropriate |
|---|---|---|---|---|---|---|
| /D.B./ | A A | 2002/0116523 | A1 | Warrier et al. | August 22, 2002 | |
| /D.B./ | A B | 2002/0141389 | A1 | Fangman et al. | October 3, 2002 | |
| /D.B./ | A C | 7,320,027 | B1 | Chang et al. | January 15, 2008 | |
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**FOREIGN PATENT DOCUMENTS**

| Examiner Initials | Doc. No. | Foreign Patent Document: Office | Foreign Patent Document: Application or Patent Number | Foreign Patent Document: Kind Code | Name of Patentee or Applicant | Date of Publication | Translation: Yes | Translation: No*+ |
|---|---|---|---|---|---|---|---|---|
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**OTHER - NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials | Doc. No. | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number (s), publisher, city and/or country where published. | Translation: Yes | Translation: No*+ |
|---|---|---|---|---|
| | | | | |
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| | | | | |

| Examiner Signature | /Deepa Belur/ | Date Considered | 08/21/2012 |
|---|---|---|---|

* A concise statement of relevance is being submitted in lieu of a translation. 37 CFR 1.98(a)(3).

\+ An English-language equivalent/patent, or an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office is being submitted in lieu of a concise explanation of relevance under 37 CFR 1.98(a)(3).

CH01/ 25606243.1

UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING OR 371(C) DATE | FIRST NAMED APPLICANT | ATTY. DOCKET NO./TITLE |
|---|---|---|---|
| 12/935,040 | 09/28/2010 | Mohamed Boucadair | P3594US |

CONFIRMATION NO. 1314

8968
DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

PUBLICATION NOTICE

*OC000000045702655*

**Title:**METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**Publication No.**US-2011-0019588-A1
**Publication Date:**01/27/2011

## NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

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Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

# PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 2, 2008

Application or Docket Number: 12/935040

## CLAIMS AS FILED - PART I

| | (Column 1) | (Column 2) | SMALL ENTITY RATE | SMALL ENTITY FEE | OR | LARGE ENTITY RATE | LARGE ENTITY FEE |
|---|---|---|---|---|---|---|---|
| U.S. NATIONAL STAGE FEES | | | | | | | |
| BASIC FEE | SMALL ENT.=$165 | LARGE ENT.=$330 | BASIC FEE | | OR | BASIC FEE | 330 |
| EXAMINATION FEE | SMALL ENT. = $110 | LARGE ENT. = $220 | EXAM. FEE | | | EXAM FEE | 220 |
| SEARCH FEE | U.S. is ISA = $50/$100 ALL other countries = $215/$430 | ALL other situations = $270/$540 | SEARCH FEE | | | SEARCH FEE | 430 |
| FEE FOR EXTRA SPEC. PGS. | 38 minus 100 = | / 50 = | X $ 135 = | | | X $ 270 = | |
| TOTAL CHARGEABLE CLAIMS | 17 minus 20 = | | X $ 26 = | | OR | X $ 52 = | |
| INDEPENDENT CLAIMS | 3 minus 3 = | 4 | X $ 110 = | | OR | X $ 220 = | 880 |
| MULTIPLE DEPENDENT CLAIM PRESENT | | | + $ 195 = | | OR | + $ 390 = | |
| * If the difference in column 1 is less than zero, enter "0" in column 2 | | | TOTAL | | OR | TOTAL | 1860 |

## CLAIMS AS AMENDED - PART II

AMENDMENT A

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE | SMALL ENTITY ADDITIONAL FEE | OR | OTHER THAN SMALL ENTITY RATE | OTHER THAN SMALL ENTITY ADDITIONAL FEE |
|---|---|---|---|---|---|---|---|---|---|
| Total | * | Minus | ** | = | X $ 26 = | | OR | X $ 52 = | |
| Independent | * | Minus | *** | = | X $ 110 = | | OR | X $ 220 = | |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐ | | | | | + $ 195 = | | OR | + $ 390 = | |
| | | | | | TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

AMENDMENT B

| | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE | SMALL ENTITY ADDITIONAL FEE | OR | OTHER THAN SMALL ENTITY RATE | OTHER THAN SMALL ENTITY ADDITIONAL FEE |
|---|---|---|---|---|---|---|---|---|---|
| Total | * | Minus | ** | = | X $ 26 = | | OR | X $ 52 = | |
| Independent | * | Minus | *** | = | X $ 110 = | | OR | X $ 220 = | |
| FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM ☐ | | | | | + $ 195 = | | OR | + $ 390 = | |
| | | | | | TOTAL ADDIT. FEE | | OR | TOTAL ADDIT. FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than '20', enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than '3', enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

# MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

(FOR USE WITH FORM PTO-875)

SERIAL NO: 12/935,040

FILING DATE:

APPLICANT(S):

## CLAIMS

| | AS FILED | | AFTER 1st AMENDMENT | | AFTER 2nd AMENDMENT | |
|---|---|---|---|---|---|---|
| | IND. | DEP. | IND. | DEP. | IND. | DEP. |
| 1 | 1 | | | | | |
| 2 | | 1 | | | | |
| 3 | | 1 | | | | |
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| 50 | | | | | | |
| TOTAL IND. | 7 | | | | | |
| TOTAL DEP. | 10 | | | | | |
| TOTAL CLAIMS | 17 | | | | | |

| | AS FILED | | AFTER 1st AMENDMENT | | AFTER 2nd AMENDMENT | |
|---|---|---|---|---|---|---|
| | IND. | DEP. | IND. | DEP. | IND. | DEP. |
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| 100 | | | | | | |
| TOTAL IND. | | | | | | |
| TOTAL DEP. | | | | | | |
| TOTAL CLAIMS | | | | | | |

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: Unassigned

Application No. 12/935,040
(U.S. National Phase of PCT/FR2009/050548)

Examiner: Unassigned

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

## COMMUNICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Applicant hereby submits an executed Combined Declaration and Power of Attorney. A Declaration of Inventorship in accordance with PCT Rule 4.17.iv was submitted in PCT Application No. PCT/FR2009/050548.

The items checked below are appropriate:

**1. Status of Applicant**

This application is on behalf of ☒ other than a small entity or ☐ a small entity.

**2. Documents Submitted Herewith**

a. ☒ Executed Combined Declaration and Power of Attorney
b. ☐ Other:

**3. Fees**

No fees are believed to be due in connection with this submission.

**4. Extension of Time**

☐ Applicant petitions for a extension of time under 37 CFR 1.136, the fee for which is .

☒ Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

**Fee Due** $0.00

**5. Total Fee Due**

The total fee due is:

| | |
|---|---|
| Late Filing of Declaration Surcharge | $ 0.00 |
| Extension of Time Fee | $ 0.00 |

**Total Fee Due:** $0.00

**6. Fee Payment**

☐ Attached is a check in the sum of $ .
☐ Charge Account No. 07-0181 the sum of $ .

**7. Fee Deficiency**

☒ If any additional fee is required in connection with this communication, charge Account No. 07-0181.

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
One of the Attorneys for Applicant(s)
DRINKER BIDDLE & REATH LLP
191 N. Wacker Drive, Suite 3700
Chicago, Illinois 60606-1698
(312) 569-1000 telephone
(312) 569-3000 facsimile
Customer No.: 08968

Date: October 27, 2010

CH01/ 25623977.1

## COMBINED DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

This declaration is of the following type:

☐ original ☐ design ☐ supplemental
☒ national stage of PCT/FR2009/050548, filed on March 31, 2009
☐ divisional ☐ continuation ☐ continuation-in-part

My residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor *(if only one name is listed below)* or an original, first, and joint inventor *(if plural names are listed below)* of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE**

the specification of which:

☐ is attached hereto.
☒ was filed on September 28, 2010, as Application No. 12/935,040, and was amended on September 28, 2010 *(if applicable)*.
☐ was filed on , by Express Mail No. *as Application No. not known yet*, and was amended on *(if applicable)*.
☐ was filed on , as PCT International Application No. , and was amended on *(if any)*.

I state that I have reviewed and understand the contents of the specification identified above, including the claim(s), as amended by any amendment referred to above.

I acknowledge the duty to disclose information that is material to the patentability of the application identified above as defined in 37 CFR 1.56.

I claim foreign priority benefits under 35 USC 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate or 365(a) of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent, utility model, design registration, or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter and having a filing date before that of the application(s) from which the benefit of priority is claimed.

| PRIOR FOREIGN PATENT, UTILITY MODEL, AND DESIGN REGISTRATION APPLICATIONS | | | | | | |
|---|---|---|---|---|---|---|
| COUNTRY | PRIOR FOREIGN APPLICATION NO. | DATE OF FILING (day,month,year) | PRIORITY CLAIMED | | | |
| France | 08 52108 | 31 March 2008 | X | YES | | NO |
| | | | | YES | | NO |
| | | | | YES | | NO |

I claim the benefit pursuant to 35 USC 119(e) of the following United States provisional patent application(s):

| PRIOR U.S. PROVISIONAL PATENT APPLICATIONS, BENEFIT CLAIMED UNDER 35 USC 119(e) | |
|---|---|
| APPLICATION NO. | DATE OF FILING (day,month,year) |
| | |
| | |
| | |

I claim the benefit pursuant to 35 USC 120 of any United States patent application(s) or PCT international application(s) designating the United States of America listed below and, insofar as the subject matter of each of the claims of this patent application is not disclosed in the prior patent application(s) in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose material information as defined in 37 CFR 1.56 effective between the filing date of the prior patent application(s) and the national or PCT international filing date of this patent application.

| PRIOR U.S. PATENT APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S., BENEFIT CLAIMED UNDER 35 USC 120 | | | | | |
|---|---|---|---|---|---|
| U.S. PATENT APPLICATIONS | | | Status *(check one)* | | |
| U.S. APPLICATION NO. | U.S. FILING DATE | | PATENTED | PENDING | ABANDONED |
| 1. | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| PCT APPLICATIONS DESIGNATING THE U.S. | | | Status *(check one)* | | |
| PCT APPLICATION NO. | PCT FILING DATE (day,month,year) | U.S. APPLICATION NOS. ASSIGNED (if any) | PATENTED | PENDING | ABANDONED |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | | | | |

| DETAILS OF FOREIGN APPLICATIONS FROM WHICH PRIORITY CLAIMED UNDER 35 USC 119 FOR ABOVE LISTED U.S./PCT APPLICATIONS | | | | |
|---|---|---|---|---|
| ABOVE APPLICATION. NO. | COUNTRY | APPLICATION NO. | DATE OF FILING (day,month,year) | DATE OF ISSUE (day,month,year) |
| 1. | | | | |
| 2. | | | | |
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| 5. | | | | |
| 6. | | | | |

As a named inventor, I hereby appoint Drinker Biddle & Reath LLP to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: Customer Number 08968.

*08968*
08968
PATENT TRADEMARK OFFICE

I further direct that correspondence concerning this application be directed to Drinker Biddle & Reath LLP: Customer Number 08968.

*08968*
08968
PATENT TRADEMARK OFFICE

I declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of **sole or first inventor:** Mohamed BOUCADAIR

Inventor's signature MOHAMED BOUCADAIR

Date 10/01/2010 Country of Citizenship: France

Residence: Rennes, France
*(city/state or country)*

Post Office Address: 1, Square Louis Harel de la Noë, 35000 Rennes, France
*(complete mailing address)*

CH01/ 25601920.1

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 8711232 |
| **Application Number:** | 12935040 |
| **International Application Number:** | |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 08968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 27-OCT-2010 |
| **Filing Date:** | 28-SEP-2010 |
| **Time Stamp:** | 12:33:01 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | no |

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Miscellaneous Incoming Letter | P3594US_Communication.pdf | 62640<br>cdf90fab04e2f87a258d4c88f361e279f3346437 | no | 2 |

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|---|---|
| **Warnings:** | |
| **Information:** | |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Oath or Declaration filed | P3594US_Combined_Declaration_and_Power_of_Attorney.pdf | 115397<br>9abc1a5af7505cf420a7fca9d7bcdcbb72ad96a3 | no | 3 |

| | |
|---|---|
| **Warnings:** | |
| **Information:** | |
| **Total Files Size (in bytes):** | 178037 |

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NUMBER | FILING or 371(c) DATE | GRP ART UNIT | FIL FEE REC'D | ATTY.DOCKET.NO | TOT CLAIMS | IND CLAIMS |
|---|---|---|---|---|---|---|
| 12/935,040 | 09/28/2010 | | 1860 | P3594US | 17 | 7 |

**CONFIRMATION NO. 1314**

8968
DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

**FILING RECEIPT**




Date Mailed: 10/22/2010

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Mohamed Boucadair, Rennes, FRANCE;

**Assignment For Published Patent Application**

France Telecom, Paris, FRANCE

**Power of Attorney:** The patent practitioners associated with Customer Number 8968

**Domestic Priority data as claimed by applicant**

This application is a 371 of PCT/FR09/50548 03/31/2009

**Foreign Applications**

FRANCE 0852108 03/31/2008

**If Required, Foreign Filing License Granted:** 10/19/2010

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/935,040**

**Projected Publication Date:** 01/27/2011

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**Preliminary Class**

## PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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## Title 35, United States Code, Section 184

## Title 37, Code of Federal Regulations, 5.11 & 5.15

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This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

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**NOT GRANTED**

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UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

| U.S. APPLICATION NUMBER NO. | FIRST NAMED APPLICANT | ATTY. DOCKET NO. |
|---|---|---|
| 12/935,040 | Mohamed Boucadair | P3594US |

8968
DRINKER BIDDLE & REATH LLP
ATTN: PATENT DOCKET DEPT.
191 N. WACKER DRIVE, SUITE 3700
CHICAGO, IL 60606

| INTERNATIONAL APPLICATION NO. | |
|---|---|
| PCT/FR09/50548 | |
| I.A. FILING DATE | PRIORITY DATE |
| 03/31/2009 | 03/31/2008 |

**CONFIRMATION NO. 1314**
**371 ACCEPTANCE LETTER**

*OC000000044087896*

Date Mailed: 10/22/2010

## NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office in its capacity as a Designated / Elected Office (37 CFR 1.495), has determined that the above identified international application has met the requirements of 35 U.S.C. 371, and is ACCEPTED for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above and the relevant dates are:

| 09/28/2010 | 09/28/2010 |
|---|---|
| DATE OF RECEIPT OF 35 U.S.C. 371(c)(1), (c)(2) and (c)(4) REQUIREMENTS | DATE OF COMPLETION OF ALL 35 U.S.C. 371 REQUIREMENTS |

A Filing Receipt (PTO-103X) will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE " FILING DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1), (c)(2) and (c)(4) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN ABOVE.** *The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363).* Once the Filing Receipt has been received, send all correspondence to the Group Art Unit designated thereon.

The following items have been received:

- Copy of the International Application filed on 09/28/2010
- English Translation of the IA filed on 09/28/2010
- Copy of the International Search Report filed on 09/28/2010
- Preliminary Amendments filed on 09/28/2010
- Information Disclosure Statements filed on 09/28/2010
- Oath or Declaration filed on 09/28/2010
- Request for Immediate Examination filed on 09/28/2010
- U.S. Basic National Fees filed on 09/28/2010
- Priority Documents filed on 09/28/2010
- Non-English Language Application filed on 09/28/2010
- Specification filed on 09/28/2010
- Claims filed on 09/28/2010
- Abstracts filed on 09/28/2010
- Drawings filed on 09/28/2010

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

PAULETTE R KIDWELL

Telephone: (571) 272-0398

Please type a plus sign (+) inside this box → 

Substitute for form 1449A/B/PTO

# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

*(Use as many sheets as necessary)*

| Sheet | 1 | of | 1 |
|---|---|---|---|

| *Complete if Known* | |
|---|---|
| Application Number | Unassigned |
| Filing Date | September 28, 2010 |
| First Named Inventor | Mohamed BOUCADAIR |
| Group Art Unit | Unassigned |
| Examiner Name | Unassigned |
| Attorney Docket Number | P3594US |

**U.S. PATENT DOCUMENTS**

| Examiner Initials | Doc. No. | U.S. Patent Document: Application or Patent Number | U.S. Patent Document: Kind Code | Name of Patentee or Applicant | Date of Publication | Filing Date If Appropriate |
|---|---|---|---|---|---|---|
| | **A A** | 2002/0116523 | A1 | Warrier et al. | August 22, 2002 | |
| | **A B** | 2002/0141389 | A1 | Fangman et al. | October 3, 2002 | |
| | **A C** | 7,320,027 | B1 | Chang et al. | January 15, 2008 | |
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**FOREIGN PATENT DOCUMENTS**

| Examiner Initials | Doc. No. | Foreign Patent Document: Office | Foreign Patent Document: Application or Patent Number | Foreign Patent Document: Kind Code | Name of Patentee or Applicant | Date of Publication | Translation: Yes | Translation: No*+ |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
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**OTHER - NON PATENT LITERATURE DOCUMENTS**

| Examiner Initials | Doc. No. | Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number (s), publisher, city and/or country where published. | Translation: Yes | Translation: No*+ |
|---|---|---|---|---|
| | | | | |
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| | | | | |

| Examiner Signature | | Date Considered | |
|---|---|---|---|

* A concise statement of relevance is being submitted in lieu of a translation. 37 CFR 1.98(a)(3).

\+ An English-language equivalent/patent, or an English-language abstract, or an English-language version of the search report or action by a foreign patent office in a counterpart foreign application indicating the degree of relevance found by the foreign office is being submitted in lieu of a concise explanation of relevance under 37 CFR 1.98(a)(3).

CH01/ 25606243.1

# Electronic Patent Application Fee Transmittal

| | |
|---|---|
| **Application Number:** | |
| **Filing Date:** | |
| **Title of Invention:** | A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Attorney Docket Number:** | P3594US |

Filed as Large Entity

## U.S. National Stage under 35 USC 371 Filing Fees

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Basic Filing:** | | | | |
| National Stage Fee | 1631 | 1 | 330 | 330 |
| Natl Stage Search Fee - Report provided | 1642 | 1 | 430 | 430 |
| National Stage Exam - all other cases | 1633 | 1 | 220 | 220 |
| **Pages:** | | | | |
| **Claims:** | | | | |
| Independent claims in excess of 3 | 1614 | 4 | 220 | 880 |
| **Miscellaneous-Filing:** | | | | |
| **Petition:** | | | | |

| Description | Fee Code | Quantity | Amount | Sub-Total in USD($) |
|---|---|---|---|---|
| **Patent-Appeals-and-Interference:** | | | | |
| **Post-Allowance-and-Post-Issuance:** | | | | |
| **Extension-of-Time:** | | | | |
| **Miscellaneous:** | | | | |
| | | **Total in USD ($)** | | **1860** |

# Electronic Acknowledgement Receipt

| | |
|---|---|
| **EFS ID:** | 8511904 |
| **Application Number:** | 12935040 |
| **International Application Number:** | PCT/FR09/50548 |
| **Confirmation Number:** | 1314 |
| **Title of Invention:** | A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE |
| **First Named Inventor/Applicant Name:** | Mohamed Boucadair |
| **Customer Number:** | 08968 |
| **Filer:** | Brian Charles Rupp/Irina Mikitiouk |
| **Filer Authorized By:** | Brian Charles Rupp |
| **Attorney Docket Number:** | P3594US |
| **Receipt Date:** | 28-SEP-2010 |
| **Filing Date:** | |
| **Time Stamp:** | 11:32:14 |
| **Application Type:** | U.S. National Stage under 35 USC 371 |

## Payment information:

| | |
|---|---|
| Submitted with Payment | yes |
| Payment Type | Deposit Account |
| Payment was successfully received in RAM | $1860 |
| RAM confirmation Number | 8999 |
| Deposit Account | 070181 |
| Authorized User | |

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. 1.492 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

## File Listing:

| Document Number | Document Description | File Name | File Size(Bytes)/ Message Digest | Multi Part /.zip | Pages (if appl.) |
|---|---|---|---|---|---|
| 1 | Transmittal of New Application | P3594US_National_Phase_Transmittal.pdf | 81942<br>620f53830be395ac466bbe6c3ee1dc264b0b08aa | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 2 | Application Data Sheet | P3594US_Application_Data_Sheet.pdf | 30676<br>335addcd577c59a923bb26253dbb2d80a5e26d5d | no | 3 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| This is not an USPTO supplied ADS fillable form | | | | | |
| 3 | | P3594US_English_Translation_of_PCT_Application.pdf | 105351<br>580e5e53781ce98008787d4835b8bbe6de8f4b20 | yes | 31 |

**Multipart Description/PDF files in .zip description**

| Document Description | Start | End |
|---|---|---|
| Specification | 1 | 25 |
| Claims | 26 | 30 |
| Abstract | 31 | 31 |

| | | | | | |
|---|---|---|---|---|---|
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 4 | Drawings-only black and white line drawings | P3594US_Drawings.pdf | 140159<br>820582de3a7d5f7ab7f3c8c6697643e3690fd340 | no | 9 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 5 | Documents submitted with 371 Applications | P3594US_Certification_of_Translation.PDF | 23470<br>5e1e8fe02017568b2f98426522e981ac9484b4ee | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 6 | Oath or Declaration filed | P3594US_Copy_of_PCT_Declaration.pdf | 84203<br>74ef3956ecbe63fd78679e6f1a781d58699c416e | no | 2 |

| | | | | | |
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| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 7 | | P3594US_Preliminary_Amendment.pdf | 86435<br>f8619f7125c4e5b6ee741d41cedc554fcb6a3d6e | yes | 9 |

| **Multipart Description/PDF files in .zip description** | | |
|---|---|---|
| **Document Description** | **Start** | **End** |
| Preliminary Amendment | 1 | 1 |
| Specification | 2 | 2 |
| Abstract | 3 | 3 |
| Claims | 4 | 8 |
| Applicant Arguments/Remarks Made in an Amendment | 9 | 9 |

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|---|---|---|---|---|---|
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 8 | Abstract | P3594US_Replacement_Abstract.pdf | 28225<br>77d13795c1cb52cbd0c2f5ec189ab35499f03d60 | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 9 | Transmittal Letter | P3594US_Information_Disclosure_Statement.pdf | 88973<br>f43006c1006258f6abf9909aa029c5e943339d6e | no | 4 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 10 | Information Disclosure Statement (IDS) Filed (SB/08) | P3594US_1449_Form.pdf | 32340<br>86ebce8dbf530654af0777c8249e340f05fd34bd | no | 1 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| This is not an USPTO supplied IDS fillable form | | | | | |
| 11 | NPL Documents | P3594US_Copy_of_Search_Report.pdf | 518379<br>3baef48ad01687dd9e176090815185a873af16f5 | no | 8 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 12 | Documents submitted with 371 Applications | P3594US_Copy_of_Written_Opinion.pdf | 437508<br>c6f942e26e4ff0aa1eccef80715147c671c5db48 | no | 11 |

| | | | | | |
|---|---|---|---|---|---|
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| 13 | Fee Worksheet (PTO-875) | fee-info.pdf | 37142<br>e933ccd0dbf28d2b21ffa309cf53be53d145e86f | no | 2 |
| **Warnings:** | | | | | |
| **Information:** | | | | | |
| | | | **Total Files Size (in bytes):** | 1694803 | |

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

| U.S. DEPARTMENT OF COMMERCE<br>PATENT AND TRADEMARK OFFICE<br>**TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371 AND 37 CFR 1.491** | | ATTORNEY DOCKET NO.<br>P3594US<br>U.S. APPLICATION NO.<br>Unassigned |
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| INTERNATIONAL APPLICATION NO.<br>PCT/FR2009/050548 | INTERNATIONAL FILING DATE<br>31 March 2009 (31.03.2009) | PRIORITY DATE CLAIMED<br>31 March 2008 (31.03.2008) |
| TITLE OF INVENTION<br>A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE | | |
| APPLICANT(S) FOR DO/EO/US<br>BOUCADAIR, Mohamed | | |

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371 and 37 CFR 1.491.

2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371 and 37 CFR 1.491.

3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)).

4. ☒ The US has been elected (PCT Article 31).

5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☐ is attached hereto (required only if not communicated by the International Bureau).
   b. ☒ has been communicated by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).

6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are attached hereto (required only if not communicated by the International Bureau).
   b. ☐ have been communicated by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☐ An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

11. Nucleotide and/or Amino Acid Sequence Submission
    a. ☐ Computer Readable Form (CRF)
    b. Specification Sequence Listing on:
       i. ☐ CD-ROM or CD-R (2 copies); or
       ii. ☐ Paper Copy
    c. ☐ Statement verifying identity of above copies

**Items 12 to 19 below concern other document(s) or information included:**

12. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
    ☒ Form PTO-1449
    ☐ Copies of Listed Documents

13. ☐ An assignment for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.

14. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

15. ☐ A substitute specification.

16. ☐ A change of power of attorney and/or address letter.

17. ☒ Application Data Sheet Under 37 CFR 1.76

18. ☐ Return Receipt Postcard

19. ☒ Other items or information: Copy of International Search Report; Copy of Written Opinion; Replacement Abstract; Certification of Translation

| U.S. APPLICATION NO. | INTERNATIONAL APPLICATION NO. | ATTORNEY DOCKET NO. |
|---|---|---|
| Unassigned | PCT/FR2009/050548 | P3594US |

| 20. The following fees are submitted: | Calculations | PTO Use Only |
|---|---|---|
| ☒ a) Basic national fee.....$330.00 | $330.00 | |
| ☒ b) Examination fee | | |
| If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4).....$0.00 | | |
| All other situations .....$220.00 | $220.00 | |
| ☒ c) Search fee | | |
| If the written opinion of the ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4).....$0.00 | | |
| Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority..... $100.00 | | |
| International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB.....$430.00 | $430.00 | |
| All other situations.....$540.00 | | |
| **TOTAL OF ABOVE CALCULATIONS =** | **$980.00** | |
| ☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing or computer program listing filed in an electronic medium). The fee is **$250.00** for each additional 50 sheets of paper or fraction thereof. | | |

| Total Sheets | Extra Sheets | Number of each additional 50 or fraction thereof (round **up** to a whole number) | RATE | | |
|---|---|---|---|---|---|
| -100= | /50= | | x **$270.00** | $0.00 | |
| Surcharge of **$130.00** for furnishing the oath or declaration later than 30 months from the earliest claimed priority date (37 CFR 1.492(e)). | | | | $0.00 | |

| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | | |
|---|---|---|---|---|---|
| Total Claims | 17 -20= | 0 | x $52.00 | $0.00 | |
| Independent Claims | 7 - 3 = | 4 | x $220.00 | $880.00 | |
| ☐ Multiple Dependent Claim(s) (if applicable) | | | + $390.00 | $0.00 | |
| | | | **TOTAL OF ABOVE CALCULATIONS=** | $1,860.00 | |
| ☐ Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2. | | | | $ | |
| | | | **SUBTOTAL=** | $1,860.00 | |
| Processing fee of **$130.00** for furnishing English Translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date. | | | | $ | |
| | | | **TOTAL NATIONAL FEE=** | $1,860.00 | |
| Fee for recording the enclosed assignment. The assignment must be accompanied by an appropriate cover sheet. **$40.00** per property | | | + | $ | |
| | | | **TOTAL FEE ENCLOSED=** | $1,860.00 | |
| | | | Amount to be: refunded | $ | |
| | | | charged: | $ | |

a. ☐ A check in the amount of $ to cover the above fee is enclosed.

b. ☒ Please charge Deposit Account No. 07-0181 in the amount of $1,860.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 07-0181. A duplicate copy of this sheet is enclosed.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.**

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Date: September 28, 2010


CH01/ 25606988.1

**Application Data Sheet**

**APPLICATION INFORMATION**

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| Filing Date:: | September 28, 2010 |
| Application Type:: | Regular |
| Subject Matter:: | Utility |
| Suggested classification:: | |
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| Representative Designation: | Registration Number: | Representative Name: |
|---|---|---|

## DOMESTIC PRIORITY INFORMATION

| Application: | Continuity Type: | Parent Application: | Parent Filing Date: |
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| This application | National Stage of | PCT/FR2009/050548 | 31 March 2009 |

## FOREIGN APPLICATION INFORMATION

| Country: | Application Number: | Filing Date: | Priority Claimed |
|---|---|---|---|
| France | 08 52108 | 31 March 2008 | Yes |

## ASSIGNEE INFORMATION

| | |
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Initial 9/28/10
Juniper Exhibit 1002, page 190

# A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

## FIELD OF THE INVENTION

The field of the invention is that of telecommunications networks, in particular IP telecommunications networks in which packets of data are transported from source equipment to destination equipment identified by a destination address.

Such a telecommunications network groups together a plurality of pieces of equipment, connections, and functions dedicated to transporting data coming from terminal equipment connected to the network. In particular, the transport functions may be implemented by activating routing and transmission protocols. A telecommunications network administered by an operator is also called a domain.

An IP connectivity service provider deploys a dedicated architecture to enable users of terminal equipment to be contacted. Access to the IP connectivity service is managed by the service provider using the telecommunications network of an operator to route data packets sent by pieces of terminal equipment to their final destination. Said service provider is sometimes also the operator of the telecommunications network.

The invention relates to a mechanism for allocating addresses and port numbers enabling the same primary address to be assigned to a plurality of pieces of terminal equipment of the telecommunications network.

Thus the invention applies to any type of public or private addressing, but it applies especially to public IP addresses defined by the Internet Protocol version 4 (IPv4), although this is not limiting on the invention.

In known manner, a home gateway between a terminal of a private home network and the public telecommunications network of an operator, also known as a domain, includes a table in which it associates the

private IP address and the port associated with the terminal with an IPv4-type public IP address and a port of the same gateway on the public network.

This table is known to the person skilled in the art as a NAT (Network Address Translation) table.

It is commonly accepted in the IP service provider community that exhaustion of public IPv4 addresses is inevitable. To avoid this problem, the community has already taken action to define a new protocol, Internet Protocol version 6 (IPv6), which offers a large number of IP addresses and a hierarchical routing mechanism offering improved performance. However, that solution is not in practice activated by operators for financial or strategic reasons. The same providers are nevertheless not indifferent to recent warnings emanating from the Internet Engineering Task Force (IETF), especially in reports presented within the Global Routing Operations Working Group (GROW) concerning the risk of exhaustion of IANA IPv4 addresses by the end of 2009.

To limit the number of IPv4 public addresses necessary to provide an IP connectivity service, a dual NAT or Operator NAT solution has been proposed and implemented. It activates a NAT function in the telecommunications network of the operator so that the home gateways use private addressing in their NAT tables. Consider a piece of terminal equipment 120 in a home network RD connected to a home gateway 220 between the terminal equipment and a telecommunications network RT (see Figure 1). The gateway implements a first NAT function NAT1 which translates a first private address pair of a data packet PT sent by the terminal equipment 120 into a second private address pair (@PRIV2, P2). It then sends the transformed PT packet in the network RT. That packet is received by network equipment NO. This equipment NO executes an Operator NAT function NAT2 that translates the second private address pair (@PRIV2, P2) of the data packet PT into a third public address pair

(@PUB3, P3). Thus it is the operator's NAT function that translates the private addresses of home gateways to public addresses, which saves a non-negligible number of IPv4 public addresses.

DISADVANTAGES OF THE PRIOR ART

The Operator NAT solution has drawbacks, including:

· the routing of IP data packets is made more complex: because of the introduction of a second level of address translation, data packets must be modified twice;

· the need to adapt the implementation of conventional application or application level gateway (ALG) signaling protocols such as DNS (domain name system), FTP (file transfer protocol), or SIP (session initiation protocol). With the SIP, for example, in order to keep its NAT table up to date, setting up and maintaining a voice over IP session require the home gateway in the SIP signaling path to act, in known manner to force artificial exchanges of signaling between the subscriber's terminal and the public network, thereby imposing a high frequency of re-registration requests; in the presence of dual network address translation, such a mechanism must also be provided in the equipment that hosts the Operator NAT function;

· degraded IP connectivity service offered by the operator of the public telecommunications network can only be deplored, especially because functions such as port forwarding or DynDNS cannot be supported in the presence of Operator NAT.

OBJECTIVES OF THE INVENTION

There is therefore a need to alleviate those drawbacks of the prior art.

To be more precise, there is a need to provide a new solution for economizing on the use of public IP addresses without this leading to degraded service being rendered to the client terminal.

STATEMENT OF THE INVENTION

The invention addresses this need by way of a method of routing a data packet in a telecommunications network, said packet including a primary destination address and a destination port number, said method including, on reception of said packet, the following steps:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting a routing identifier of a destination piece of equipment of the packet from a plurality of terminal equipment routing identifiers associated with said destination address on the basis of the determined port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

In a correlated way, the invention provides a device for routing an IP data packet in a telecommunications network, said packet including a primary destination address and a destination port number, characterized in that said device is adapted, on reception of said packet, to implement means for:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

Thus the invention is based on an entirely novel and inventive approach to routing a data packet that relies on a unique combination consisting of the destination address of the packet, the port mask defining a range of port numbers that includes the destination port number of the received packet and a routing identifier of the destination terminal equipment. The invention thus makes

it possible to assign the same routable primary address in the telecommunications network to a plurality of pieces of terminal equipment connected to that network and thus to economize on the use of public IP addresses without having recourse to the Operator NAT solution. The invention thus constitutes a solution to the exhaustion of IPv4 addresses that is simple, effective, and continuous with standard practices in the field. It enables a provider to increase its customer base significantly. It requires no sizeable investment and it thus enables capital expenditures (CAPEX) and operative expenditures (OPEX) to be optimized.

The invention applies to routing data packets to any type of destination terminal equipment, whether or not it is connected to a home network, and in particular, without this being limiting on the invention, to a home gateway between a home network and a public telecommunications network.

The routing method of the invention is implemented by telecommunications network equipment. Consequently, the invention also provides telecommunications network equipment adapted to receive a data packet containing a destination address and a destination port number, said equipment including a routing device of the invention.

All data streams sent to the terminal equipment therefore pass through such equipment, which may be a router or dedicated equipment of the telecommunications network.

The primary address is advantageously a public address. An advantage of using public addresses is that this avoids address translation and protocol correction at the periphery of a domain administered by a service provider.

In a first implementation of the invention, said at least one identifier is a secondary address of the destination terminal equipment. Such a secondary address, also referred to as private address, cannot be

routed throughout the telecommunications network. It has a restricted range, limited to exchanging streams between the terminal equipment and the telecommunications network equipment using the method of the invention. This address is not announced beyond the border gateway protocol (BGP) domain of the telecommunications network of a given operator.

The method advantageously further includes, before the routing step, a step of transforming the packet to add to it said secondary address, and the packet is routed to the destination terminal equipment on the basis of said secondary address.

According to one aspect of the first implementation of the invention, the transformation step encapsulates the packet in another packet sent to said secondary address.

An advantage of this encapsulation is that it does not require modification of the internal structure of the packet. This avoids writing and calculating a new checksum.

According to another aspect of the first implementation of the invention, the transformation step adds the secondary address of the destination equipment to a field of the packet.

A first advantage of this is that such transformation makes it possible to optimize the use of bandwidth because, unlike the encapsulation process, it does not require the addition of two headers. A second advantage is that it exploits the source routing option of the Internet Protocol, for example.

In a second implementation of the invention, the identifier is a route identifier specific to the terminal equipment and the packet is routed on the basis of said specific route identifier. Here a specific route is a dedicated route for connecting to this equipment and that serves only this terminal equipment in the plurality of pieces of equipment having the same primary address.

Combined with the primary address and the port mask assigned to the destination terminal equipment, this specific route identifier makes it possible both to identify that equipment uniquely and to route the received data packet.

An advantage is that no transformation of the packet is necessary. This implementation of the invention requires work on the underlying telecommunications network of the operator in order to install in the equipment that implements the invention separate routes to pieces of equipment having the same primary address.

In one particular implementation of the invention the steps of the method of routing a data packet are determined by computer program instructions.

Consequently, the invention also provides a computer program on a data medium and adapted to be executed in a routing device or more generally in a computer, this program including instructions adapted to execute the steps of a routing method as described above.

This program may use any programming language and take the form of source code, object code or a code intermediate between source code and object code, such as a partially-compiled form, or any other desirable form.

The invention also provides a computer-readable data medium containing instructions of a computer program as referred to above.

The data medium may be any entity or device capable of storing the program. For example, the medium may include storage means, such as a read only memory (ROM), for example a compact disk (CD) ROM or a micro-electronic circuit ROM, or magnetic storage means, for example a floppy disk or a hard disk.

The data medium may be a transmissible medium such as an electrical or optical signal, which may be routed via an electrical or optical cable, by radio or by other means. The program of the invention may in particular be downloaded over an Internet-type network.

Alternatively, the data medium may be an integrated circuit in which the program is incorporated, the circuit being adapted to execute the method in question or to be used in its execution.

The invention also provides a method of configuring terminal equipment connected to a telecommunications network, including, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message including said primary address, said port mask, and said routing identifier.

A plurality of pieces of terminal equipment configured in accordance with the invention receive the same primary address. It is the combination of this primary address, the routing identifier, and the port mask that makes it possible to identify them individually and uniquely.

According to one aspect of the invention, the configuration method includes a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet containing said primary address as the destination address to said piece of terminal equipment and the configuration message further includes said routing device identifier.

In this way, the terminal equipment knows the identity of the device for routing data packets that are intended for it.

According to one aspect of the invention, said configuration message is further sent to a telecommunications network including a routing device able to route to said piece of terminal equipment a data

packet containing said primary address as the destination address.

The configuration method of the invention is implemented by a configuration server in a telecommunications network adapted, on reception of a configuration request sent by said equipment, to implement means for:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message including said primary address, said port mask, and said routing identifier.

The invention also provides a method of configuring a piece of terminal equipment connected to a telecommunications network, characterized in that, on reception of a configuration message including configuration data including a primary address, a port mask defining a range of numbers that is dedicated thereto, and a routing identifier, said method includes the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet including as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

According to one aspect of the invention, the configuration method further includes a step of sending the configuration data to a device of the invention for routing a data packet.

This routing device is the attachment device of the piece of terminal equipment. It sees in transit all the

data packets intended for the piece of terminal equipment.

According to another aspect of the invention, on reception of a data packet including a destination address, a port number, and a routing identifier, said method further includes a step of verifying that the port number belongs to the range of numbers defined by its port mask and a step of rejecting said packet if the verification result is negative.

The configuration method is advantageously implemented by client terminal equipment connected to a telecommunications network, characterized in that, on reception of a configuration message including configuration data including a primary address having a plurality of pieces of terminal equipment, a port mask defining a range of numbers that is dedicated to it, and a routing identifier, it is adapted to implement means for:

- storing said configuration data; and
- before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet including as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

In one particular implementation of the invention, the steps of the configuration method are determined by computer program instructions.

Consequently, the invention also provides a computer program on a data medium and adapted to be executed in a home gateway or more generally in a computer and including instructions adapted to execute the steps of a configuration method as described above.

The invention further provides a method of translating addresses of a data packet received by a home gateway in a telecommunications network placed between terminal equipment sending said packet and terminal

equipment receiving said packet, said packet including a first address and a first port number of the sender terminal equipment, said method being characterized in that it includes a step of replacing said first address and the first port number with a primary address and a second port number, said second port number belonging to a range of numbers dedicated to said gateway and determined by a port number mask.

When terminal equipment finds itself in a home network managed by a home gateway configured in accordance with the invention, the home gateway implements an address translation mechanism that entails not only replacing the first address of the terminal equipment with its primary address but also selecting a port number in its dedicated range.

In one particular implementation, the steps of the method of translating addresses of a data packet are determined by computer program instructions.

Consequently, the invention also provides a computer program on a data medium and adapted to be executed in a home gateway or more generally in a computer and including instructions adapted to execute the steps of a configuration method as described above.

## LIST OF FIGURES

Other advantages and features of the invention become more clearly apparent on reading the following description of one particular implementation of the invention given by way of illustrative and non-limiting example only, and from the appended drawings, in which:

· Figure 1, described above, shows diagrammatically a telecommunications network implementing the prior art Operator NAT function;

· Figures 2A and 2B show two examples of port number masks of the invention;

· Figure 3 shows diagrammatically a plurality of pieces of terminal equipment of the invention connected to a telecommunications network of an operator;

· Figure 4 shows a method of the invention of routing a data packet in a telecommunications network;

· Figure 5 shows, in its environment, telecommunications network equipment executing the routing method of the invention;

· Figure 6 shows diagrammatically an implementation of the invention in which the routing identifier is a route identifier dedicated to the destination terminal equipment of the data packet;

· Figure 7 shows diagrammatically the method of the invention of configuring a piece of terminal equipment;

· Figure 8 shows diagrammatically, in its environment, terminal equipment executing the configuration method of the invention;

· Figure 9 shows a terminal equipment configuration method of the invention; and

· Figure 10 shows diagrammatically, in its environment, a home gateway implementing the configuration method of the invention.

## DESCRIPTION OF ONE PARTICULAR IMPLEMENTATION OF THE INVENTION

The general principle of the invention relies on assigning the same primary address to a plurality of pieces of terminal equipment in a telecommunications network, these pieces of terminal equipment being uniquely identified by a routing identifier and a port mask defining a range of port numbers that is dedicated to them.

It should be noted that the expression terminal equipment is general and designates equally terminal equipment connected directly to the telecommunications network or to a home gateway.

The inventors have found that pieces of terminal equipment do not make use simultaneously of all the $2^{16}$ (i.e. 65536) port number values available thereto. This range is larger than the real requirements of a client, since a client uses only a few connections for P2P (Peer to Peer), FTP (File Transfer Protocol), web browsing, telephone, etc. applications.

The invention consists in reducing the range of port numbers available to terminal equipment for each application by assigning a piece of terminal equipment a port mask that defines a sub-portion of this range. The port mask assigned in this way to a particular piece of terminal equipment is used in combination with its primary IP address to route data packets that are sent to it without degrading IP service.

It should be noted that an IP connectivity service provider must comply with the constraint that two pieces of terminal equipment having the same primary address must necessarily receive different port masks.

For example, the connectivity service provider may force the value of the most significant bit of the field corresponding to the source port number of the IP data packets sent by a given piece of terminal equipment. The terminal equipment then has available a port mask defining a range of 32768 possible port number values.

In a variant, the provider may force the value of the first eight more significant bits so that the terminal equipment has a usable range of 256 port numbers.

A port number is therefore still coded in a 16-bit field but a portion of the field is forced by the IP connectivity service provider. Two examples of port number masks of the invention are described with reference to Figures 2A and 2B, one example of a contiguous mask and one example of a non-contiguous mask:

· a contiguous mask uses an adjacent set of bits (binary representation of the port field). This variant

is simple to implement and requires no processing and implementation intelligence for the equipment implementing the invention. The range associated with a contiguous mask is a continuous and unique range. The authorized values are contained within a single interval.

· a non-contiguous mask uses non-adjacent bits. The resulting range of ports may be defined by combining a plurality of "small" continuous ranges. The advantage of this second variant is the possibility of assigning the default range of ports to a plurality of pieces of terminal equipment at the same time.

A telecommunications network RT of an operator on which a service provider has deployed an IP connectivity or access service architecture is described with reference to Figure 3. A plurality of pieces of terminal equipment have access to this network. Below the term terminal equipment refers equally to the pieces of terminal equipment 110, 120, 130, 140, 160, 170, for example telephones or personal computers, connected directly to the network RT and to a home gateway 230, 220 between a home network and the telecommunications network RT.

Such a gateway has an address translation table or NAT table that matches a private address and a first port number of a piece of terminal equipment of its private network to at least its own public address and a second port number.

The telecommunications network RT of the operator advantageously includes at least one routing device AN 300 implementing the data packet routing method of the invention. It should be noted that it may include a plurality of other devices, such as the routing device 310.

This routing method is described below with reference to Figure 4. On reception of a data packet PT containing a destination public address @PUB and a destination port number P2, the routing method of the

invention executes a step E1 of determining a port mask defining a range of port numbers to which the port number P2 belongs. The port masks assigned to the pieces of terminal equipment of the network may advantageously be stored in a database BD1. In a step E2, this port mask MP is used to select a destination equipment of the packet PT from a plurality of pieces of terminal equipment having the same public address P2 and to identify it by means of its routing identifier IDR. The packet is then routed in step E3 to the destination equipment selected on the basis of its routing identifier IDR. If the routing device AN 300 has no entry in its routing tables, the packet in question is eliminated.

In the implementation described with reference to Figure 5, the routing device AN 300 of the invention includes the elements that are conventionally found in a conventional computer, namely a processor 310, a random-access memory (RAM) 320, a read-only memory (ROM) 330, and telecommunications means 340 for communicating with the network 1.

According to the invention, the routing device AN 300 includes a memory 350 containing a database in which it stores the association between the public address @PUB, the port mask MP, and the routing identifier IDR of the terminal equipment 100. It should be noted that this memory may equally be external to the device provided that it can access it to recover the identification data of the destination terminal equipment for the received data packet.

The read-only memory 330 constitutes a storage medium of the invention and stores a computer program of the invention including instructions for executing the steps of the routing method of the invention described above with reference to Figure 4.

The routing device AN of the invention has for its main function maintaining a table of the correspondences between the routing identifier IDR and the pair (public

IP address @PUB, port mask MP) so as to be able to determine unambiguously to which piece of terminal equipment the data packet containing the destination address @PUB shared by a plurality of pieces of terminal equipment must be transmitted. The device AN may be located in an access PoP (point of presence) to the telecommunications network RT or it may be centralized. It may be hosted by a router or a by dedicated equipment.

The primary address @PUB of a piece of terminal equipment is announced by the routing device AN, for example using the interior gateway protocol (IGP) such as the routing information protocol (RIP), intermediate system to intermediate system (IS-IS) protocol or OSPF (open shortest path first) protocol. This makes it possible to force the passage of IP packets intended for any public IP address assigned as the main address to at least two pieces of terminal equipment.

In a first implementation of the invention, the routing identifier IDR is a private address, also known as a secondary address, of the terminal equipment. Such an address is not announced by the routing device AN. Consequently, it cannot be routed in the core of the RT network. Nor can it be contacted from the Internet. If the device AN is in an access POP to the network RT, its range is limited to exchanges between the terminal equipment and the equipment constituting said POP.

A second implementation of the routing method of the invention is described below with reference to Figure 6. In this implementation, the routing identifier IDR is a route identifier dedicated to the terminal equipment. Such an identifier uniquely designates a route that serves the terminal equipment uniquely and unambiguously. This is achievable with the aid of separate routes, for example. Two routes R1 and R2 are referred to as separate if none of the nodes constituting the route R1 in the network of the operator is crossed by the route R2. Accordingly, the routes R1 and R2 consist of a

succession of nodes, none of these nodes being shared between the two routes. To this end, the topology of the underlying telecommunications network must be constructed to enable the installation of separate routes in the routing table maintained by the routing device AN of the invention.

Clearly, in the invention, the piece of terminal equipment 100 and the routing device AN 300 must be configured before being connected to the network.

The method of the invention of configuring a piece of terminal equipment is described below with reference to Figure 7. On being connected to the telecommunications network RT of the operator, for example following powering up, the terminal equipment 100, 200, 210, 220, 130 sends a configuration request to the IP connectivity service of the service provider in a known manner. Such a request RQ-CONF is received by a configuration server SC that supplies in return the configuration data necessary for implementing its IP connectivity service.

It may be, for example, a DHCP request DHCP_DISCOVER() broadcast in the telecommunications network of the IP service provider. This message may be relayed by a DHCP client relay or received directly by a DHCP configuration server. On reception of this message, a DHCP configuration server responds to the sender of the DHCP_DISCOVER() message with a dedicated DHCP_OFFER() message containing a DHCP lease.

The configuration method of the invention is used by the configuration server SC on reception of the configuration request RQ-CONF. A step E"1 assigns to said piece of terminal equipment a public address that is shared with a plurality of pieces of terminal equipment. A step E"2 then assigns to said piece of terminal equipment a port mask MP defining a range of numbers that is dedicated to it and a routing identifier IDR. Such configuration data @PUB, IDR, and MP is finally sent to

said piece of terminal equipment in a configuration message MESS-CONF.

According to one aspect of the invention, the configuration server designates an attachment routing device AN 300 for the piece of terminal equipment. The configuration data is also sent to this routing device AN 300 by the configuration server SC. The configuration message MESS-CONF then further includes an identifier of the attachment routing device AN 300.

If configuration is effected by a DHCP server, the configuration message MESS-CONF is a DHCP_OFFER() type offer that contains the IP configuration data relating to the configuration of the terminal equipment that requested it. Such data includes at least:

· an IPv4 secondary address @PRIV;

· an IPv4 primary address @PUB;

· a port mask MP that is the subject of a new DHCP option with the following format:

| Code | Len | Val |
|---|---|---|
| TBA | variable | MP |

· Code: this field gives the code of the option. The value of this field must be assigned by the Internet Assigned Numbers Authority (IANA); the length of this field is 1 byte;

· Len: this field gives the length of the value of the option; for the port mask option, the value of this field is equal to "variable";

· Val: this field gives the value of the port mask; this value is coded as the "port" field of the IP transport protocols; the value MP is used to determine the range of port numbers usable by a home gateway.

The identifier of the attachment routing device AN may in this situation be an identifier a.b.c.d. equal to its IP address or to its fully-qualified domain name (FQDN). It is also the subject of a new DHCP option.

The form of the attachment routing device option (DAN) is as follows:

| Code | Len | Val |
|---|---|---|
| TBA | variable | MP |

· Code: this field gives the code of the option. The value of this field must be assigned by the Internet Assigned Numbers Authority (IANA); the length of this field is 1 byte;

· Len: this field gives the length of the value of the option; for the attachment routing device option (DAN), the value of this field is equal to "4";

· Val: this field gives the value of the parameter DAN; this value is coded in the form of an IP address.

The DHCP configuration service must be modified to implement the invention and notably to assign the new configuration data to any terminal equipment, for example a home gateway, requesting IP connectivity access.

In the implementation of the invention described with reference to Figure 8, the configuration server SC 400 of the invention includes the hardware elements conventionally found in a conventional computer, namely a processor 410, a random-access memory (RAM) 420, a read-only memory (ROM) 430, and telecommunications means 440 for communicating with the network 1.

According to the invention, the configuration server SC 400 includes a memory 450 containing a database in which it stores the configuration data of the pieces of terminal equipment that it manages, notably the association between the primary address @PUB, the port mask MP, and the routing identifier IDR of the piece of terminal equipment 100. It should be noted that this memory may equally be external to the configuration server provided that it can access it to recover the configuration data of the terminal equipment sending the configuration request.

In response to a configuration request sent to the configuration server SC 400, the terminal equipment of the invention receives the configuration message MESS-CONF containing the configuration data of its IP connectivity to the telecommunications network RT. On reception of this message, it executes the configuration method of the invention described below with reference to Figure 9. In a step E"1 it stores the received configuration data in the database BDT. When it wishes to send a data packet PT into the telecommunications network RT, it selects (step E"3) a port P2 in the range of port numbers defined by the port mask PT and it assigns to the data packet PT a source port corresponding to the port P2.

On reception of a data packet PT' from the telecommunications network, it executes a step E"4 of verifying that a port P'2 of said packet belongs to the port mask MP and rejects the packet (step E"5) if the result of the verification is negative.

In a variant, the method further includes a step E"2 of sending configuration data to the equipment AN 300 of the telecommunications network RT including the routing device of the invention.

It is therefore clear that the routing device of the invention may be configured either via the terminal equipment or directly by the configuration server SC 400.

Configuration via the terminal equipment applies when the routing identifier IDR is a secondary address @PRIV. After activating the new configuration received in the configuration message MESS-CONF, which may be a DHCP lease, the terminal equipment generates a configuration message BIND() to the routing device AN of the invention. This device is identified by the address DAN in the message MESS-CONF. The message BIND(@PRIV, @PUB, MP) includes at least the main address of the terminal equipment, its routing identifier IDR, and its port mask. It advantageously further includes an

identifier of the routing device able to route to the terminal equipment data packets that are addressed to it. It is sent by the terminal equipment with a source address equal to @PRIV. On reception of this message, the routing device AN sends an acknowledgement to the terminal equipment sending it by means of an acknowledgement message.

If the routing identifier IDR is a route identifier dedicated to the terminal equipment, two variants may be envisaged for sending the message BIND(). In both variants, the configuration server SC knows all of the routes maintained by the routing device AN:

· in the first variant, the message BIND() is advantageously sent to the routing device AN by the configuration server SC. It should be noted that, in the latter event the configuration server sends the message BIND() and this message includes the main address @PUB, the port mask MP, and the identifier of the route to be used. On reception of this message, by consulting its routing table with pre-installed separate routes, the routing device of the invention associates a specific route identifier with the equipment IDR and (@PUB, MP) received.

· in the second variant, the identifier of the route to be used is sent by the configuration server SC on the same terms as @PUB and MP. The terminal sends a message BIND() containing the following information: @PUB, MP, and IDR. However, this second variant is not recommended because clients should not be aware of the routing policies installed by the service provider.

The content of the BIND() messages sent to the routing device AN 300 by the following pieces of terminal equipment is considered with reference to Figure 8:

· the terminal equipment 110 sends the message BIND(@PUB1, MP1, IDR1);

· the home gateway 220 of the terminal equipment 120 sends the message BIND(@PUB2, MP2, IDR2);

· the home gateway 230 of the terminal equipment 130 sends the message BIND(@PUB3, MP3, IDR3);

· the terminal equipment 140 sends the message BIND(@PUB4, MP4, IDR4).

Once the message BIND() has been received by the routing device AN of the invention, the device AN proceeds to instantiate a new entry in a table of associations (or bindings). Said table makes it possible to determine unambiguously to which of all the machines generated by the routing device AN having the same main address @PUB it is necessary to send a message addressed to said given IP address (i.e. @PUB) assigned as the main address.

To this end, the routing device AN maintains the association (IDR, (@PUB, MP)). In the Figure 8 example, the table of associations contains the following associations:

· IDR1 (@PUB, MP1)

· IDR2 (@PUB, MP2)

· IDR3 (@PUB, MP3)

· IDR4 (@PUB, MP1)

In a variant implementation, the signature of the message BIND() may contain a lifetime as given in the DHCP lease. Moreover, an association installed in the association table may be refreshed by means of other messages BIND(). If no update is received before the lifetime expires, the corresponding entry is eliminated from the list (a margin of accuracy may be envisaged).

In another variant, the message BIND() may be sent by the configuration server SC 400 and not by the terminal equipment that has just been configured. The information required for installing a new entry in the table of associations may be sent directly by the service provider to the routing device AN 300 via the configuration server SC 400.

The example of a data packet PT (@PUB, P2) sent by the terminal equipment 110 to the terminal equipment 120

is considered with reference to Figure 8. On reception of this packet addressed to an IP main address @PUB, the routing device AN proceeds to read the destination port number P2 of said message and deduces the corresponding port mask MP2. Using this mask and the main address @PUB, the routing device AN determines, by scanning its table of associations, the routing identifier IDR2, for example the secondary address @PRIV2 associated with the pair (@PUB, MP2).

Following determination of the secondary address, the routing device AN transforms the received IP packet into a packet PT'(@PUB, P2, IDR2). For security reasons, the destination port number to be used for this packet PT' is negotiated between the terminal equipment 120 and the routing device AN.

It should be noted that the packet PT may be transformed in various ways. In a first implementation of the invention it is encapsulated in a packet PT' containing by way of destination address the secondary address @PRIV2 of the destination terminal equipment 120, for example.

In a second implementation of the invention, the packet PT is modified to include the secondary address @PRIV2 in a particular field of its header. This transformation of the data packet makes a source routing mode possible. It is not always supported by the nodes of a telecommunications network.

In a third implementation of the invention, the packet PT is transformed identically, routing being effected on the basis of the dedicated route identifier IDR2, which requires no modification of the packet.

In the implementation of the invention described with reference to Figure 8, the terminal equipment 100 of the invention includes the hardware elements conventionally found in a conventional computer, namely a processor 110, a random-access memory (RAM) 120, a read-

only memory (ROM) 130, and telecommunications means 140 for communicating with the network 1.

According to the invention, the terminal equipment 100 includes a memory 150 containing a database in which it stores its configuration data, notably the association between the public address @PUB, the port mask MP and the routing identifier IDR of the terminal equipment 100. It should be noted that this memory may equally be external to the terminal equipment provided that it can access it to recover the configuration data that it needs to make use of its IP connectivity to the telecommunications network RT.

In an implementation of the invention described with reference to Figure 10, there is considered a piece of terminal equipment 110 connected to the home network of a home gateway 210 between the terminal equipment 110 and the telecommunications network RT. In this implementation, the home gateway 210 constitutes terminal equipment of the invention. In known manner, it includes an address translation table or NAT table that, for a stream sent by a terminal equipment 110 of its home network, matches an address @PRIV1 and a port P1 of the terminal in the home network with at least one public address @PUB2 and a port P2 of the home gateway 210 in the telecommunications network RT of the operator, P2 belonging to the range of numbers defined by the port mask MP. This table NAT is stored in a database BDP, for example, which may be internal or external.

A home gateway of the invention therefore uses address translation means on reception of a data packet PT sent by a terminal equipment of its home network and addressed to the telecommunications network and on reception of a data packet PT' addressed to that terminal equipment.

For outgoing calls, the only difference compared to existing practices is that the terminal equipment 110 or the home gateway 120 of the invention is obliged to

choose a source port in the range fixed by the port mask assigned by the service provider. All messages, with the exception of BIND() messages, are sent with as their source address the main address or the public address @PUB assigned by the service provider. For BIND() messages, the source address used is the secondary address IDR2 = @PRIV2.

The data packets sent by a given piece of terminal equipment advantageously pass in transit through the routing device AN 300 to which this terminal equipment is attached. The routing device AN proceeds to mark the IP data packets sent by this terminal equipment. The DS (differentiated services) or ToS (type of service) field of the IP packets may be used for marking if and only if the mask of the port does not exceed 6 bits. On reception of the message BIND(), the routing device AN pre-installs a marking rule for messages sent by the terminal equipment in question. The encapsulation process is then guided by the value of the field DS of the IP packets received and thus the routing device AN no longer needs to inspect the information relating to the transport layer. This improves the message processing time. This variant assumes that the terminal machine does not modify the DS/ToS code used and that it is reset to the same value for the response packets.

The routing device of the invention may be hosted by traditional routers or by dedicated pieces of equipment. Given that the modifications required by the invention during the phase of discovering a configuration server, for example under the DHCP protocol, are not major, current architectures may be adapted.

The routing device AN of the invention may be hosted anywhere in the telecommunications network of the operator. It is advantageously deployed in a network access POP. Moreover, one or more routing devices AN may be deployed within the same IP access POP, in either centralized or distributed manner.

CLAIMS

1. A method of routing an IP data packet in a telecommunications network, said packet including a primary destination address and a destination port number, characterized in that said method includes, on reception of said packet, the following steps:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

2. A method according to claim 1 of routing an IP data packet, characterized in that said at least one identifier is a secondary destination address of the destination piece of equipment.

3. A method according to claim 2 of routing an IP data packet, characterized in that the method includes, before the routing step, a step of transforming the packet to add to it said secondary address and the packet is routed on the basis of said secondary address.

4. A routing method according to claim 1, characterized in that the identifier is a route identifier specific to said pieces of equipment and the packet is routed on the basis of said specific route identifier.

5. A device for routing an IP data packet in a telecommunications network, said packet including a primary destination address and a destination port number, characterized in that said device is adapted, on reception of said packet, to implement means for:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

6. Telecommunications network equipment adapted to receive an IP data packet including a primary destination address and a destination port number, characterized in that it includes at least one routing device including means for:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

7. A method of configuring a piece of terminal equipment connected to a telecommunications network, characterized in that it includes, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message including said primary address, said port mask, and said routing identifier.

8. A method according to claim 7 of configuring a terminal equipment, characterized in that it includes a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet containing said primary address as the destination address to said piece of terminal equipment and the configuration message further includes said routing device identifier.

9. A configuration method according to claim 7, characterized in that said configuration message is further sent to a routing device able to route to said piece of terminal equipment a data packet containing said primary address as the destination address.

10. A configuration server in a telecommunications network, characterized in that, on reception of a configuration request sent by a piece of terminal equipment, it is adapted to implement means for:

· assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message including said public address, said port mask, and said routing identifier.

11. A method of configuring a piece of terminal equipment connected to a telecommunications network, characterized in that, on reception of a configuration message including configuration data including a primary address, a port mask defining a range of numbers that is dedicated thereto, and a routing identifier, said method includes the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet including as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

12. A configuration method according to claim 11, characterized in that, once an identifier of a routing device adapted to route a data packet including said primary address as the destination address to said piece of terminal equipment has been received, said method further includes a step of sending the configuration data to said routing device.

13. A configuration method according to claim 11, characterized in that, on reception of a data packet including a destination address, a port number, and a routing identifier, said method further includes a step of verifying that the port number belongs to the range of numbers defined by its port mask and a step of rejecting said packet if the result of verification is negative.

14. A piece of client terminal equipment connected to a telecommunications network, characterized in that, on reception of a configuration message including configuration data including a primary address with a plurality of pieces of terminal, a port mask defining a range of numbers that is dedicated to it, and a routing identifier, it is adapted to implement the following means:

· storing said configuration data;

· before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet including as source address the primary

address of said piece of terminal equipment and as source port number the selected port number.

15. A computer program product downloadable from a communications network and/or stored on a computer-readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the routing method according to claim 1.

16. A computer program product downloadable from a communications network and/or stored on a computer-readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the configuration method according to claim 7.

17. A computer program product downloadable from a communications network and/or stored on a computer-readable medium and/or executable by a microprocessor, characterized in that it includes program code instructions for executing the method according to claim 11.

# A B S T R A C T

A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

The invention relates to a method of routing a data packet in a telecommunications network, said packet including a primary destination address and a destination port number. On reception of said packet, the following steps are executed: determining a port mask defining a range of port numbers to which the destination port number belongs; selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the port mask; and routing the packet to the destination piece of equipment on the basis of said identifier.

Translation of the title and the abstract as they were when originally filed by the Applicant. No account has been taken of any changes that might have been made subsequently by the PCT Authorities acting ex officio, e.g. under PCT Rules 37.2, 38.2, and/or 48.3.

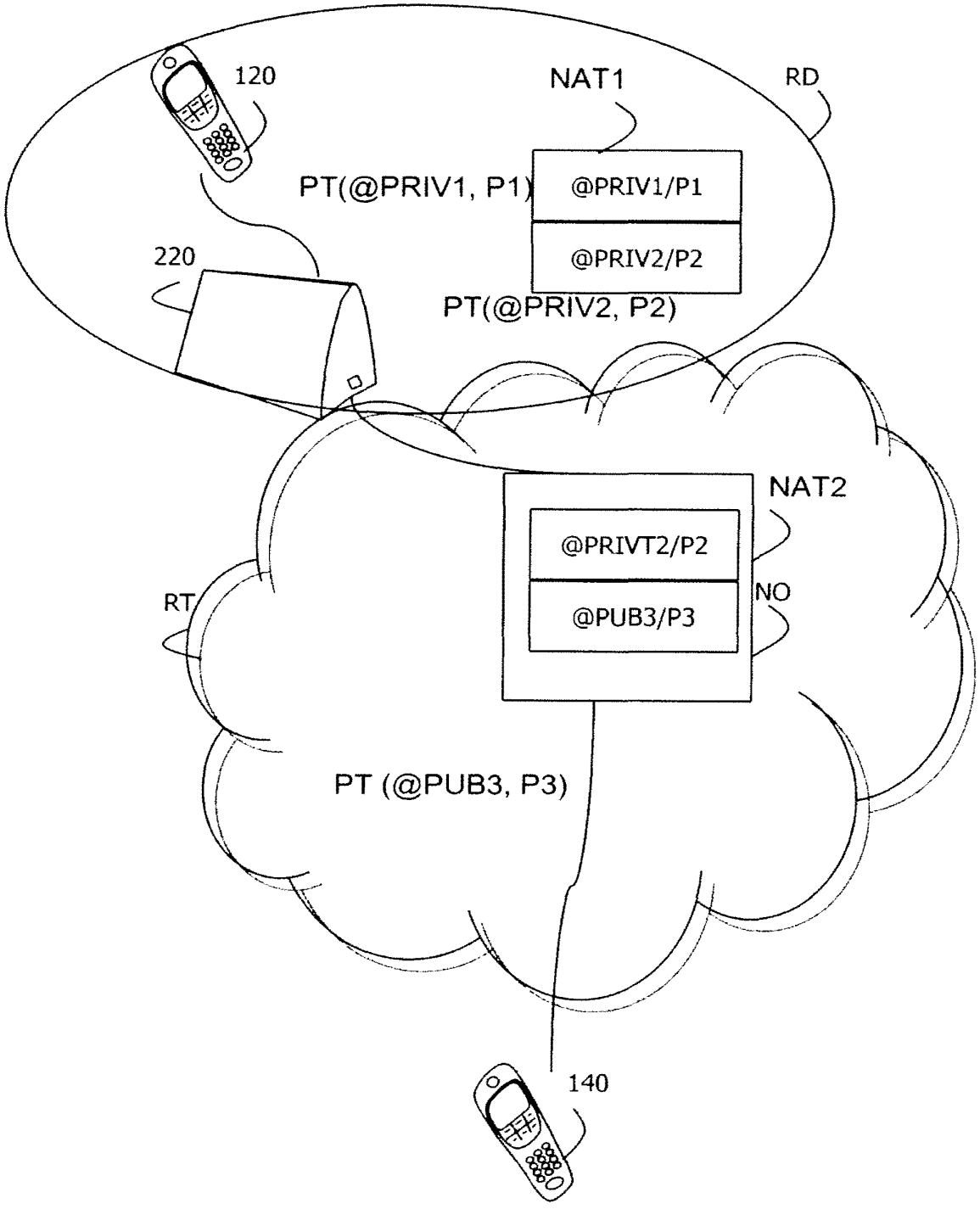

120
NAT1
RD
PT(@PRIV1, P1)
@PRIV1/P1
@PRIV2/P2
220
PT(@PRIV2, P2)
NAT2
@PRIVT2/P2
@PUB3/P3
NO
RT
PT (@PUB3, P3)
140

FIG. 1

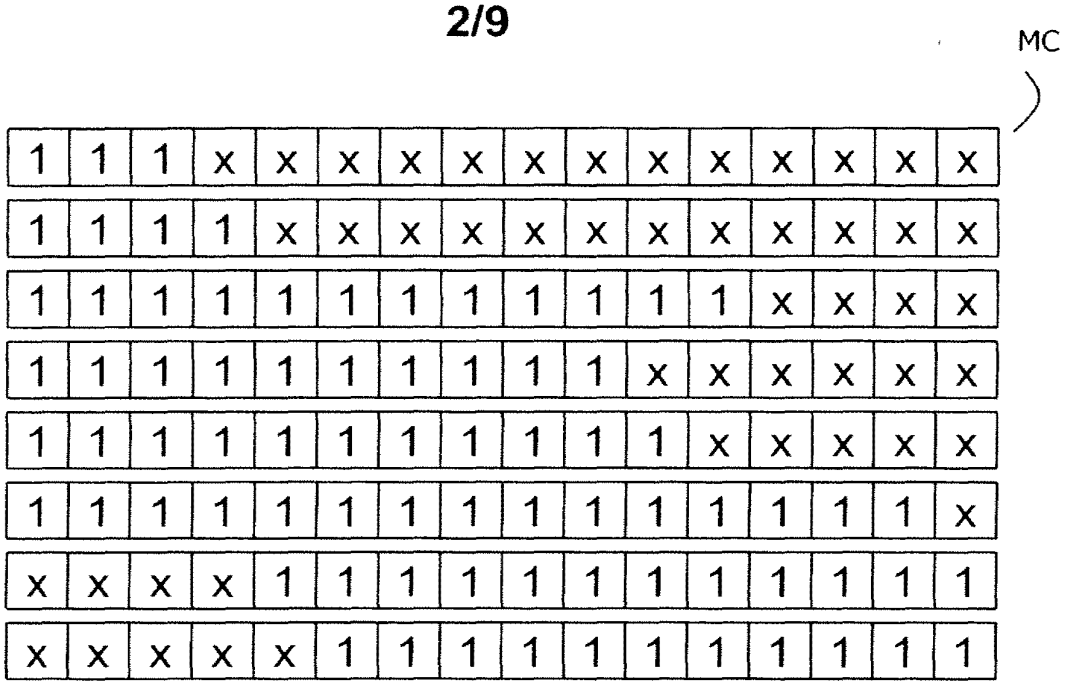

MC
1 1 1 x x x x x x x x x x x x x
1 1 1 1 x x x x x x x x x x x x
1 1 1 1 1 1 1 1 1 1 1 1 x x x x
1 1 1 1 1 1 1 1 1 1 x x x x x x
1 1 1 1 1 1 1 1 1 1 1 x x x x x
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 x
x x x x 1 1 1 1 1 1 1 1 1 1 1 1
x x x x x 1 1 1 1 1 1 1 1 1 1 1

FIG. 2A

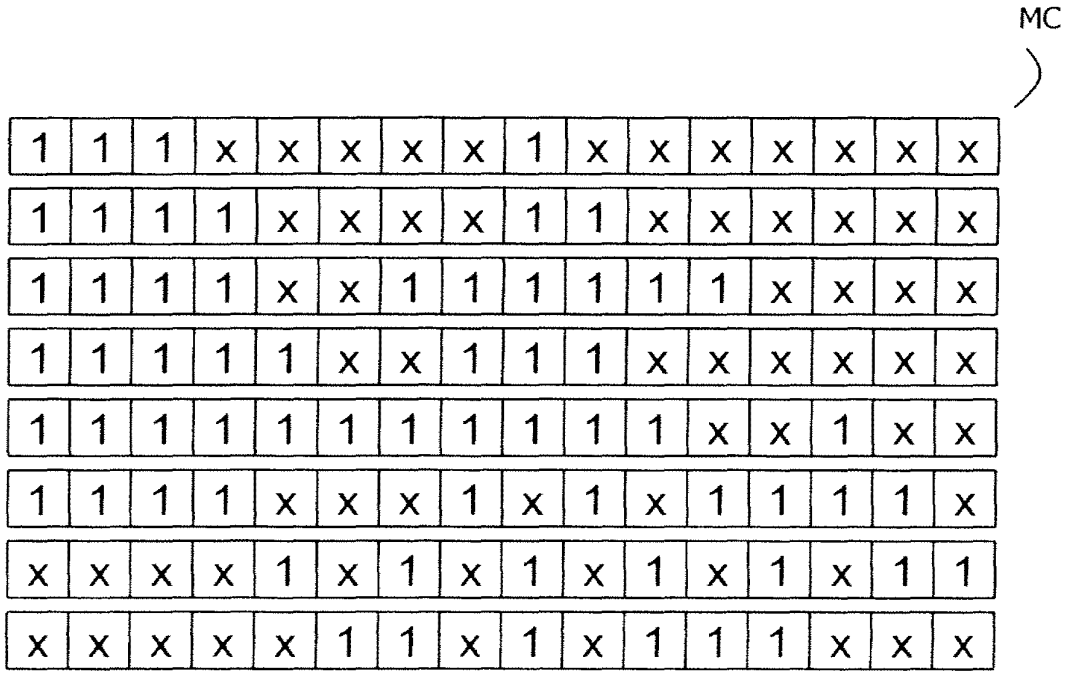

MC
1 1 1 x x x x x 1 x x x x x x x
1 1 1 1 x x x x 1 1 x x x x x x
1 1 1 1 x x 1 1 1 1 1 1 x x x x
1 1 1 1 1 x x 1 1 1 x x x x x x
1 1 1 1 1 1 1 1 1 1 1 x x 1 x x
1 1 1 1 x x x 1 x 1 x 1 1 1 1 x
x x x x 1 x 1 x 1 x 1 x 1 x 1 1
x x x x x 1 1 x 1 x 1 1 1 x x x

FIG. 2B

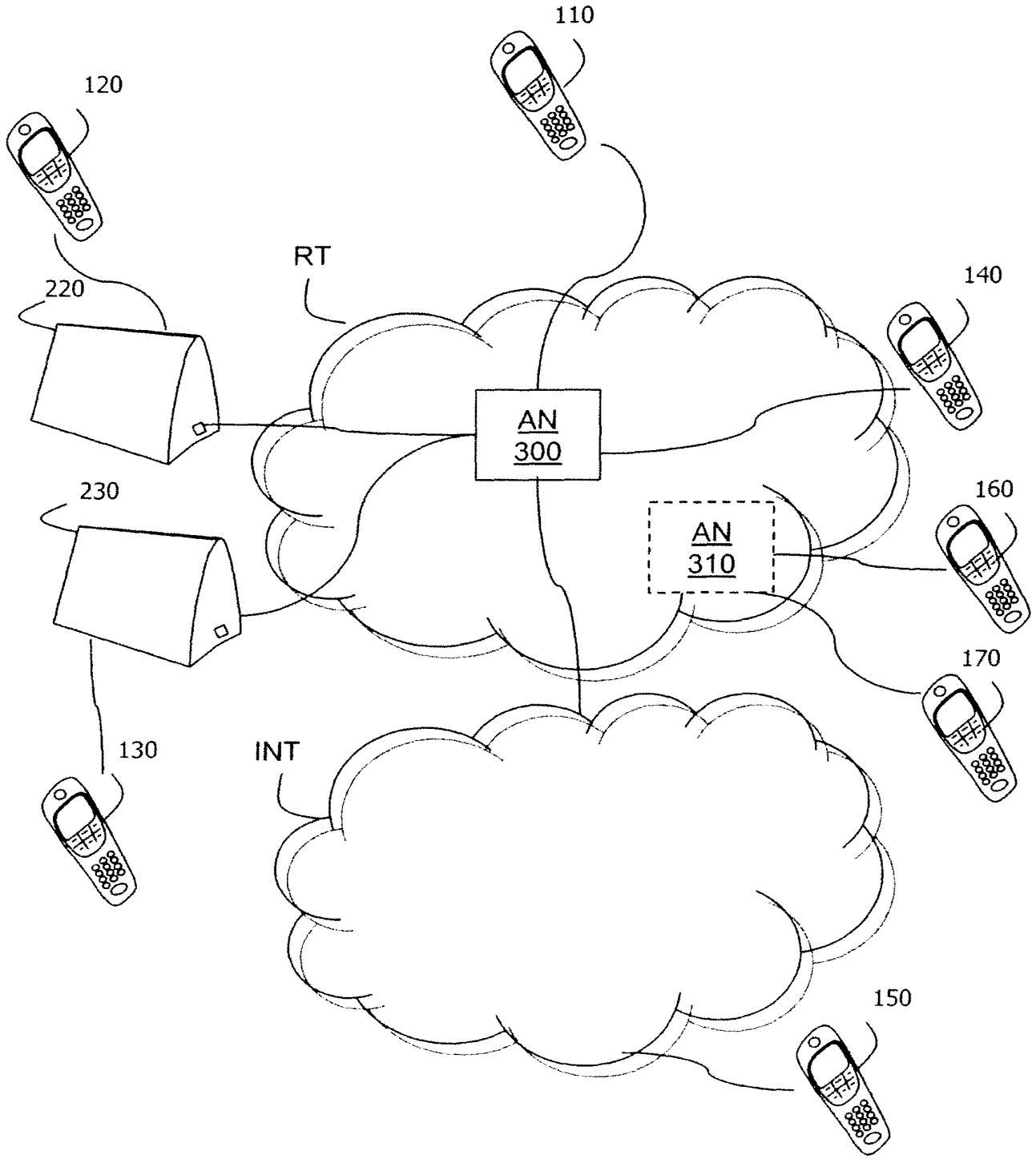



FIG. 3

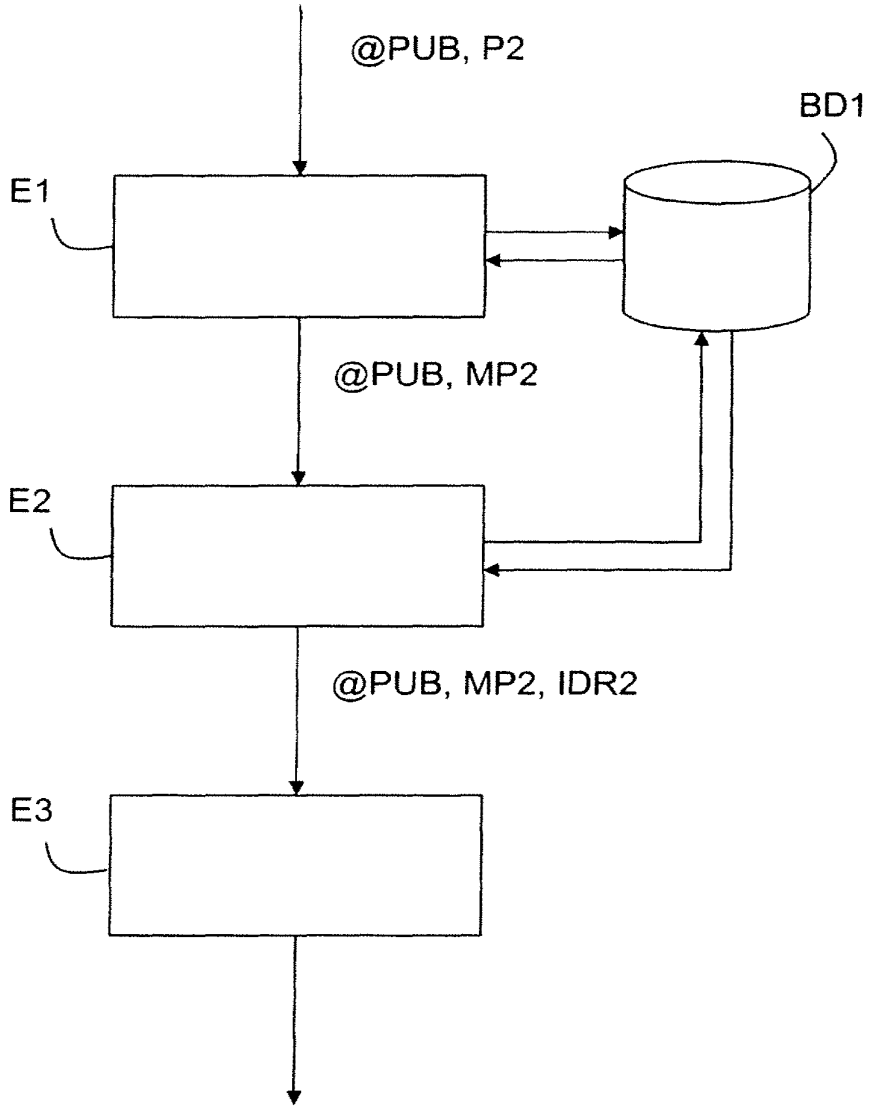



FIG. 4

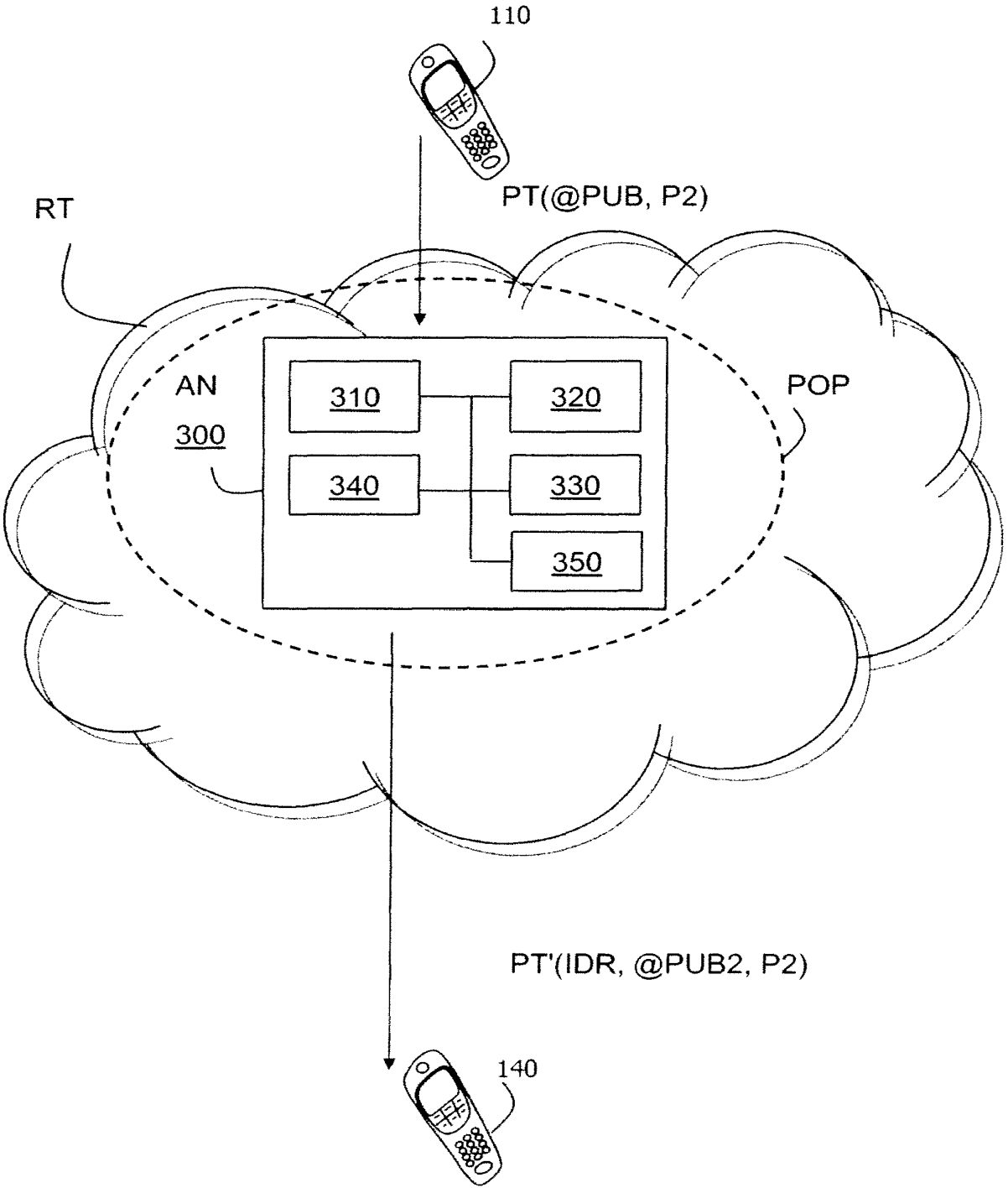



FIG. 5

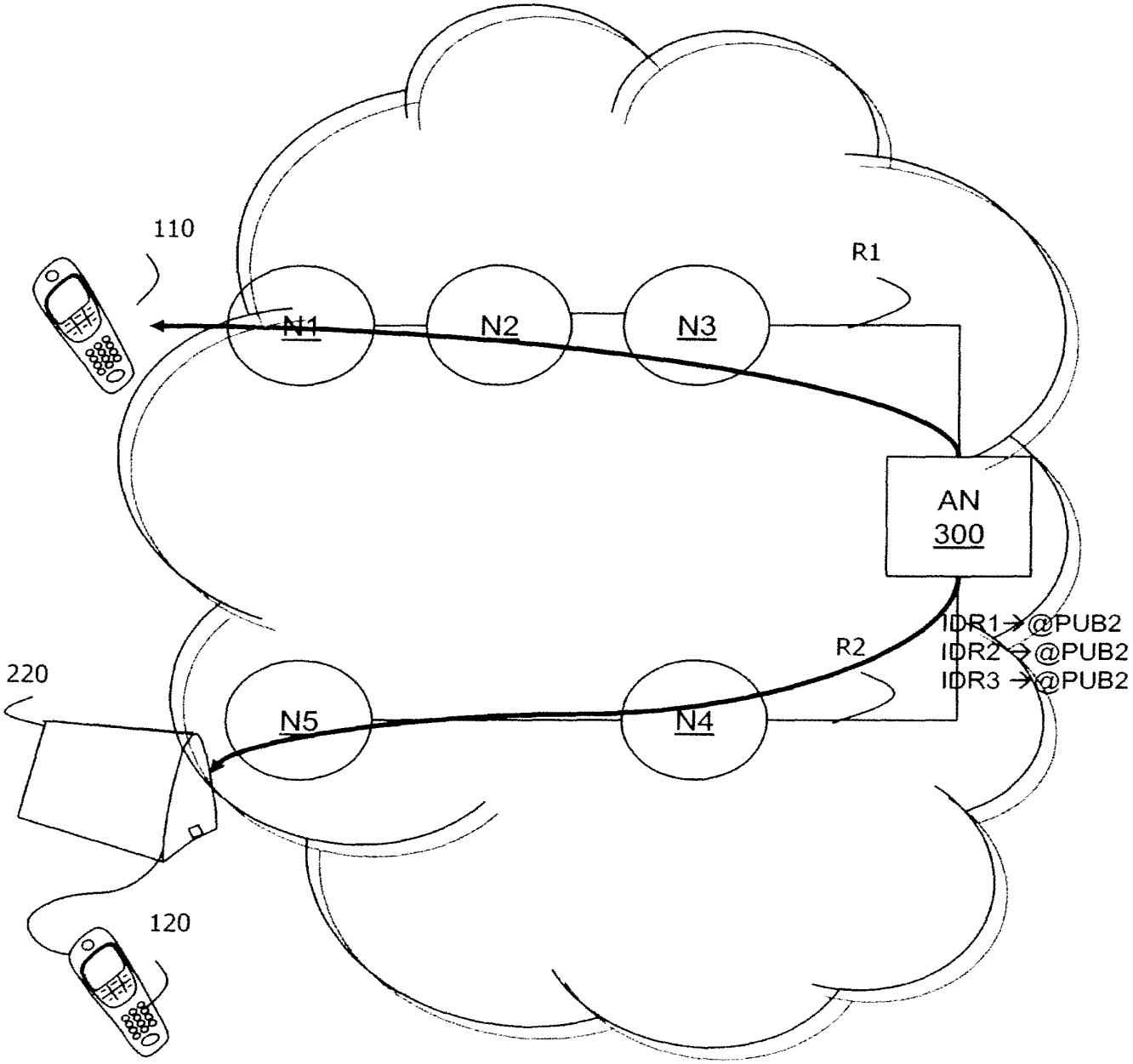

110
R1
N1
N2
N3
AN
300
IDR1→@PUB2
IDR2→@PUB2
IDR3→@PUB2
R2
220
N5
N4
120

FIG. 6

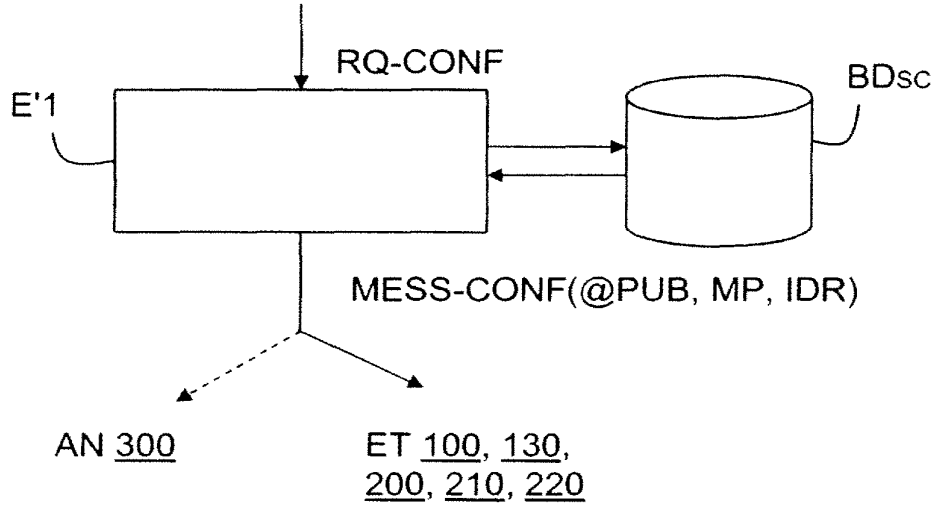

RQ-CONF
E'1
BDsc
MESS-CONF(@PUB, MP, IDR)
AN 300
ET 100, 130,
200, 210, 220

FIG. 7

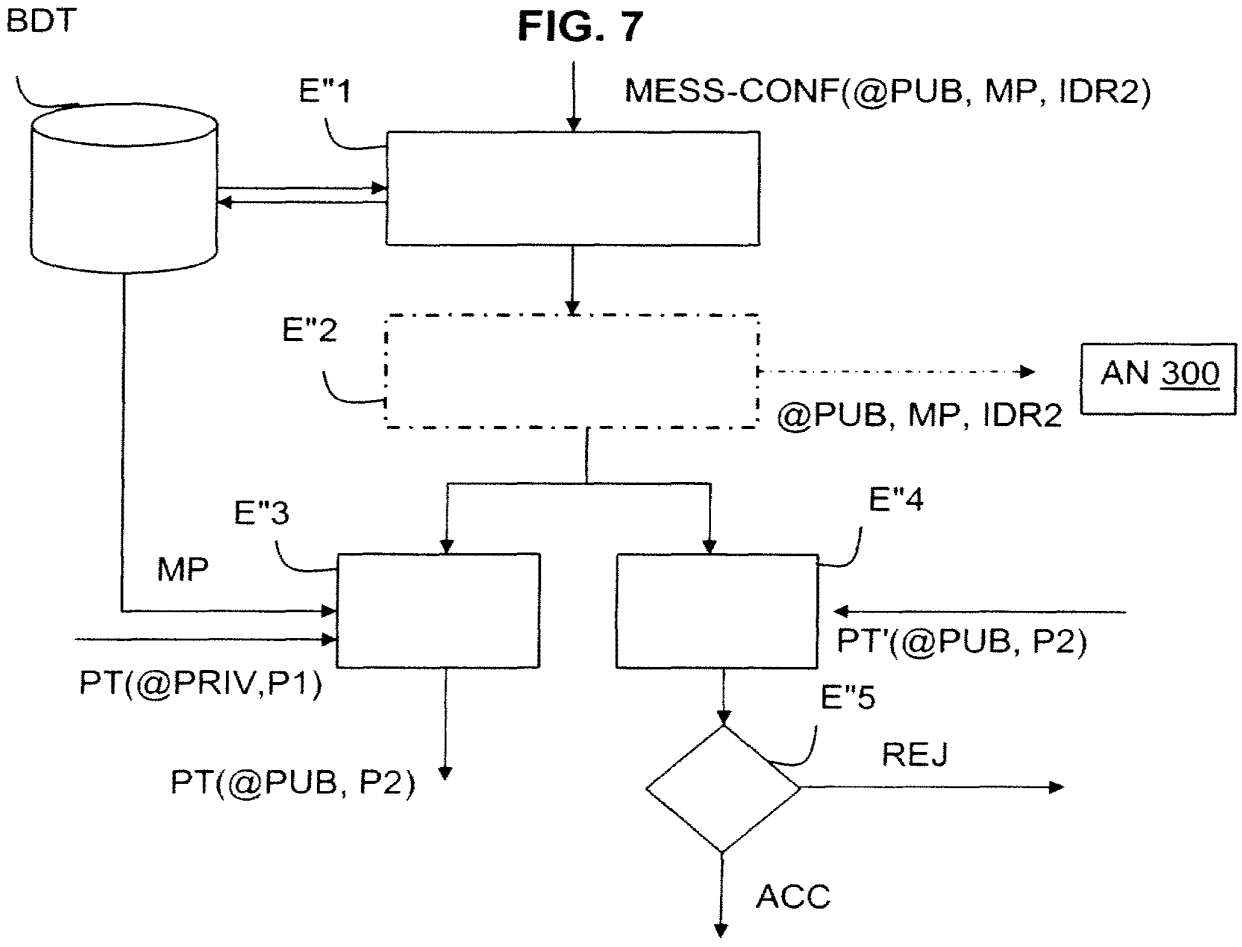

BDT
E"1
MESS-CONF(@PUB, MP, IDR2)
E"2
AN 300
@PUB, MP, IDR2
E"3
E"4
MP
PT'(@PUB, P2)
PT(@PRIV,P1)
E"5
REJ
PT(@PUB, P2)
ACC

FIG. 9

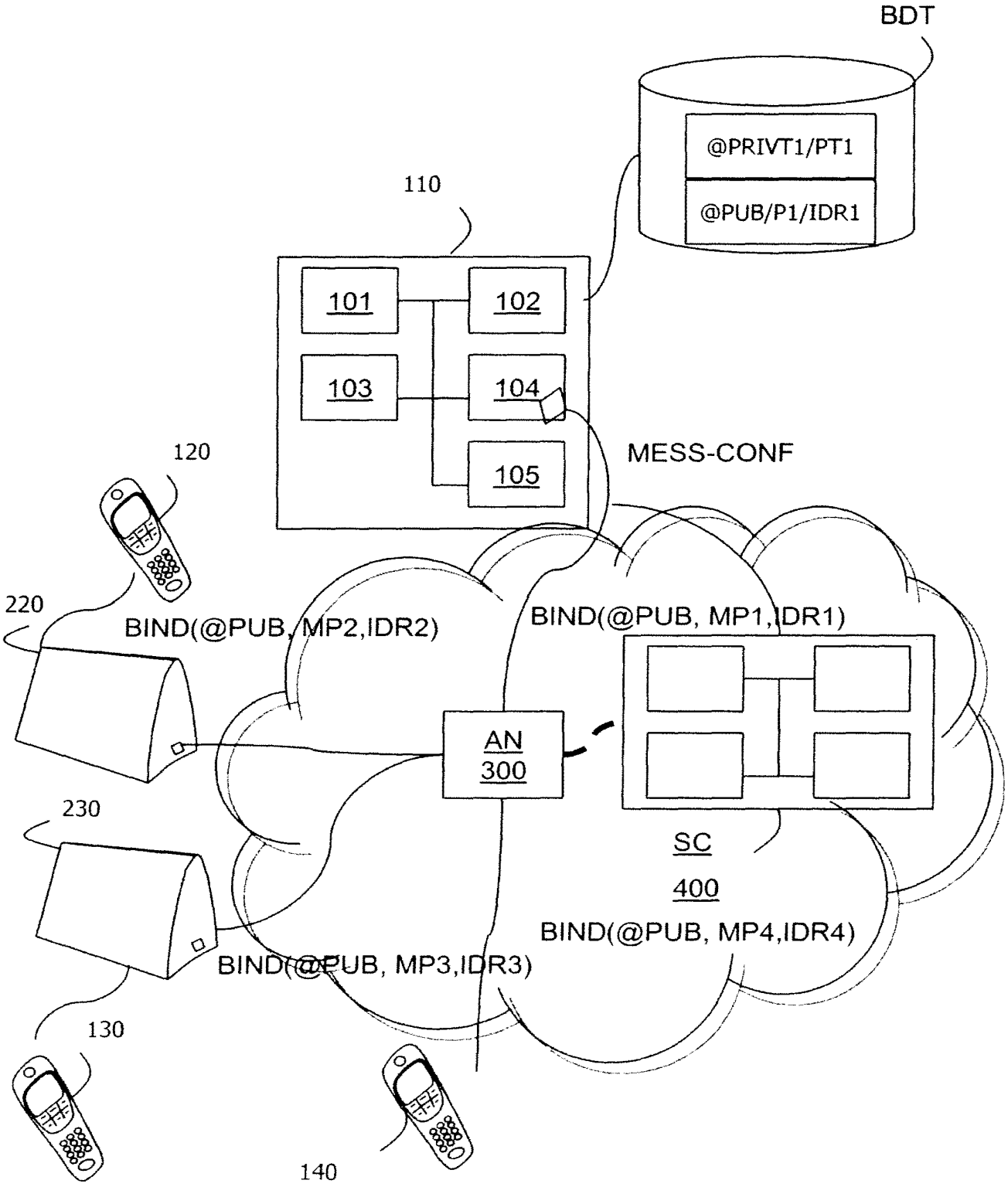

BDT
@PRIVT1/PT1
@PUB/P1/IDR1
110
101
102
103
104
105
MESS-CONF
120
220
BIND(@PUB, MP2,IDR2)
BIND(@PUB, MP1,IDR1)
AN
300
230
SC
400
BIND(@PUB, MP4,IDR4)
BIND(@PUB, MP3,IDR3)
130
140

FIG. 8

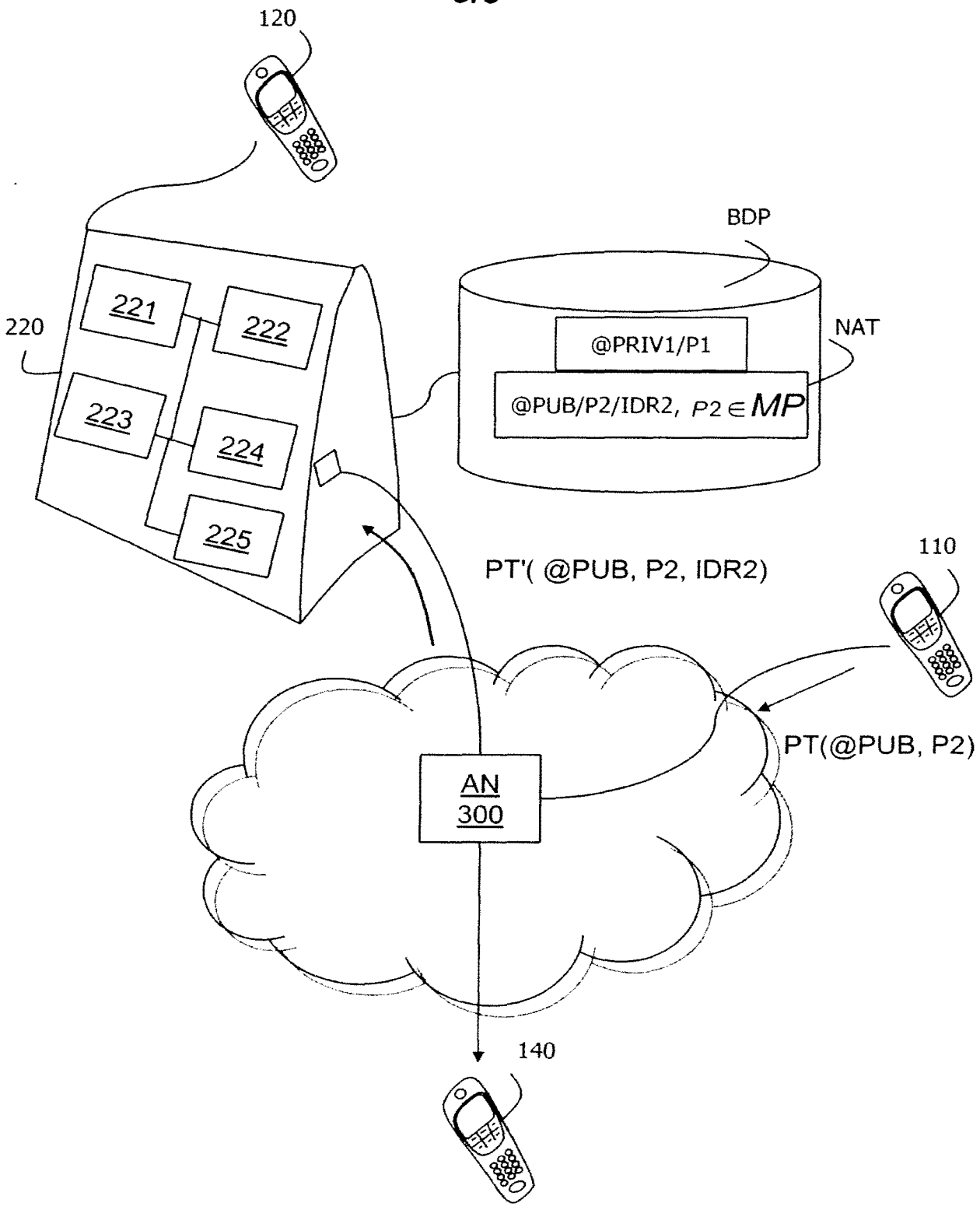

120
BDP
220
221
222
223
224
225
@PRIV1/P1
@PUB/P2/IDR2, P2 ∈ MP
NAT
PT'( @PUB, P2, IDR2)
110
PT(@PUB, P2)
AN
300
140

FIG. 10

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Mohamed BOUCADIR

Serial No:

Filed:

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**DECLARATION**

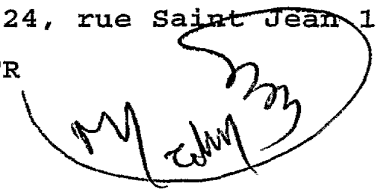
I, Andrew Scott Marland, of 11, rue de Florence, 75008 Paris, France, declare that I am well acquainted with the English and French languages and that the attached translation of the French language PCT international application, Serial No. **PCT/FR2009/050548** is a true and faithful translation of that document as filed.

All statements made herein are to my own knowledge true, and all statements made on information and belief are believed to be true; and further, these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any document or any registration resulting therefrom.

Date: September 3, 2010

Andrew Scott Marland

| | | |
|---|---|---|
| VIII-4-1 | **Déclaration : Qualité d'inventeur (seulement aux fins de la désignation des États-Unis d'Amérique)**<br>Déclaration relative à la qualité d'inventeur (règles 4.17.iv) et 51bis.1.a)iv)) aux fins de la désignation des États-Unis d'Amérique : | Par la présente, je declare que je crois être le premier inventeur original et unique (si un seul inventeur est mentionné ci-dessous) ou l'un des premiers coïnventeurs (si plusieurs inventeurs sont mentionnés ci-dessous) de l'objet revendiqué pour lequel un brevet est demandé.<br>La présente déclaration a trait à la demande internationale PCT/FR2009/050548 (si la déclaration est remise en vertu de la règle 26ter)<br>Par la présente, je déclare que mon domicile, mon adresse postale et ma nationalité sont tels qu'indiqués près de mon nom.<br>Par la présente, je déclare avoir passé en revue et comprendre le contenu de la demande internationale à laquelle il est fait référence ci-dessus, y compris les revendications de ladite demande. J'ai indiqué dans la requête de ladite demande, conformément à la règle 4.10 du PCT, toute revendication de priorité d'une demande étrangère et j'ai identifié ci-dessous, sous l'intitulé "Demandes antérieures", au moyen du numéro de demande, du pays ou du membre de l'Organisation mondiale du commerce, du jour, du mois et de l'année du dépôt, toute demande de brevet ou de certificat d'auteur d'invention déposée dans un pays autre que les États-Unis d'Amérique, y compris toute demande internationale selon le PCT désignant au moins un pays autre que les États-Unis d'Amérique, dont la date de dépôt est antérieure à celle de la demande étrangère dont la priorité est revendiquée. |
| VIII-4-1-1 | Demandes antérieures : | |

| | | |
|---|---|---|
| | | Par la présente, je reconnais l'obligation qui m'est faite de divulguer les renseignements dont j'ai connaissance et qui sont pertinents quant à la brevetabilité de l'invention, tels qu'ils sont définis dans le Titre 37, § 1.56, du Code fédéral des réglementations, y compris, en ce qui concerne les demandes de continuation-in-part les renseignements pertinents qui sont devenus accessibles entre la date de dépôt de la demande antérieure et la date du dépôt international de la demande de continuation-in-part.<br>Je déclare par la présente que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique; et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des États-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci. |
| VIII-4-1-1-1 | Nom (NOM DE FAMILLE, prénom) : | BOUCADAIR, Mohamed |
| VIII-4-1-1-2 | Domicile :<br>(ville et État (des États-Unis d'Amérique), le cas échéant, ou pays) | CAEN, France |
| VIII-4-1-1-3 | Adresse postale : | 124, rue Saint Jean 14000 CAEN France |
| VIII-4-1-1-4 | Nationalité : | FR |
| VIII-4-1-1-5 | Signature de l'inventeur :<br>(La signature doit être celle de l'inventeur, il ne peut s'agir de celle du mandataire) |  |
| VIII-4-1-1-6 | Date : | 14-04-09 |

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: Unassigned

Application No. Unassigned
(U.S. National Phase of PCT/FR2009/050548)

Examiner: Unassigned

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

**PRELIMINARY AMENDMENT**

Mail Stop PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

Prior to the examination of the above-identified patent application, please amend the application as follows:

**Amendments to the Specification** begin on page 2 of this paper.

**Amendments to the Abstract** begin on page 3 of this paper.

**Amendments to the Claims** are reflected in the listing of claims which begins on page 4 of this paper.

**Remarks** begin on page 9 of this paper.

**Amendments to the Specification**

At page 1, please insert the following new paragraph below the title:

CROSS-REFERENCE TO RELATED APPLICATIONS

This application is the U.S. national phase of the International Patent Application No. PCT/FR2009/050548 filed March 31, 2009, which claims the benefit of French Application No. 08 52108 filed March 31, 2008, the entire content of which is incorporated herein by reference.

At page 1, between lines 9 and 10, insert the following heading:

BACKGROUND

At page 3, line 6, amend the following heading:

~~DISADVANTAGES OF THE PRIOR ART~~

At page 3, line 31, amend the following heading:

~~OBJECTIVES OF THE INVENTION~~ SUMMARY

At page 4, line 2, amend the following heading:

~~STATEMENT OF THE INVENTION~~

At page 11, line 25, amend the following heading:

~~LIST OF FIGURES~~ BRIEF DESCRIPTION OF THE DRAWINGS

At page 12, lines 24-25, amend the following heading:

DETAILED DESCRIPTION ~~OF ONE PARTICULAR IMPLEMENTATION OF THE INVENTION~~



Juniper Exhibit 1002, page 235

**Amendments to the Abstract**

Please replace the Abstract with the following new Abstract:

A method of routing a data packet in a telecommunications network, said packet comprising a primary destination address and a destination port number. On reception of said packet, the following steps are executed: determining a port mask defining a range of port numbers to which the destination port number belongs; selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the port mask; and routing the packet to the destination piece of equipment on the basis of said identifier.

A replacement Abstract is attached hereto on a separate sheet in accordance with 37 CFR 1.72.



Juniper Exhibit 1002, page 236

**Amendments to the Claims**

This listing of claims will replace all prior versions and listings of claims in the application.

Claim 1 (currently amended): A method of routing an IP data packet in a telecommunications network, said packet ~~including~~ comprising a primary destination address and a destination port number, ~~characterized in that~~ said method ~~includes~~ comprising, on reception of said packet, the following steps:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

Claim 2 (currently amended): [[A]] The method according to claim 1 of routing an IP data packet, ~~characterized in that~~ wherein said at least one identifier is a secondary destination address of the destination piece of equipment.

Claim 3 (currently amended): [[A]] The method according to claim 2 of routing an IP data packet, ~~characterized in that the method includes~~ comprising, before the routing step, a step of transforming the packet to add to it said secondary address and the packet is routed on the basis of said secondary address.

Claim 4 (currently amended): [[A]] The routing method according to claim 1, ~~characterized in that~~ wherein the identifier is a route identifier specific to said pieces of equipment and the packet is routed on the basis of said specific route identifier.

Claim 5 (currently amended): A device for routing an IP data packet in a telecommunications network, said packet ~~including~~ comprising a primary destination address

and a destination port number, ~~characterized in that~~ wherein said device comprises ~~is adapted~~, on reception of said packet, ~~to implement~~ means for:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

Claim 6 (currently amended): Telecommunications network equipment adapted to receive an IP data packet ~~including~~ comprising a primary destination address and a destination port number, ~~characterized in that it includes~~ comprising at least one routing device ~~including~~ comprising means for:

· determining a port mask defining a range of port numbers to which the destination port number belongs;

· selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said primary destination address on the basis of the port mask; and

· routing the packet to the destination equipment on the basis of said identifier.

Claim 7 (currently amended): A method of configuring a piece of terminal equipment connected to a telecommunications network, ~~characterized in that it includes~~ comprising, on reception of a configuration request sent by said equipment, the following steps:

· assigning to said piece of terminal equipment a primary address shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message ~~including~~ comprising said primary address, said port mask, and said routing identifier.

Claim 8 (currently amended): [[A]] The method according to claim 7 of configuring a terminal equipment, ~~characterized in that it includes~~ comprising a step of assigning to said piece of terminal equipment an identifier of a routing device adapted to route a data packet containing said primary address as the destination address to said piece of terminal equipment and the configuration message further ~~includes~~ comprising said routing device identifier.

Claim 9 (currently amended): [[A]] The configuration method according to claim 7, ~~characterized in that~~ wherein said configuration message is further sent to a routing device that routes ~~able to route~~ to said piece of terminal equipment a data packet containing said primary address as the destination address.

Claim 10 (currently amended): A configuration server in a telecommunications network, ~~characterized in that~~ wherein, on reception of a configuration request sent by a piece of terminal equipment, comprises ~~it is adapted to implement~~ means for:

· assigning a primary address to said piece of terminal equipment, said primary address being shared with a plurality of pieces of terminal equipment;

· assigning to said piece of terminal equipment a port mask defining a range of numbers dedicated to it and a routing identifier; and

· sending to said piece of terminal equipment a configuration message ~~including~~ comprising said public address, said port mask, and said routing identifier.

Claim 11 (currently amended): A method of configuring a piece of terminal equipment connected to a telecommunications network, ~~characterized in that~~ wherein, on reception of a configuration message ~~including~~ comprising configuration data ~~including~~ comprising a primary address, a port mask defining a range of numbers that is dedicated thereto, and a routing identifier, said method ~~includes~~ comprises the following steps:

· storing said configuration data; and

· before sending a data packet into the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet ~~including~~

comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

Claim 12 (currently amended): [[A]] The configuration method according to claim 11, ~~characterized in that~~ wherein, once an identifier of a routing device adapted to route a data packet ~~including~~ comprising said primary address as the destination address to said piece of terminal equipment has been received, said method further ~~includes~~ comprises a step of sending the configuration data to said routing device.

Claim 13 (currently amended): [[A]] The configuration method according to claim 11, ~~characterized in that~~ wherein, on reception of a data packet ~~including~~ comprising a destination address, a port number, and a routing identifier, said method further ~~includes~~ comprises a step of verifying that the port number belongs to the range of numbers defined by its port mask and a step of rejecting said packet if the result of verification is negative.

Claim 14 (currently amended): A piece of client terminal equipment connected to a telecommunications network, ~~characterized in that~~ wherein, on reception of a configuration message ~~including~~ comprising configuration data ~~including~~ comprising a primary address with a plurality of pieces of terminal, a port mask defining a range of numbers that is dedicated to it, and a routing identifier, the terminal equipment comprising a means for ~~it is adapted to implement the following means~~:

· storing said configuration data;

· before sending a data packet in the telecommunications network, selecting a port number in the range of port numbers defined by the port mask, said data packet ~~including~~ comprising as source address the primary address of said piece of terminal equipment and as source port number the selected port number.

Claim 15 (currently amended): A non-transitory computer program product ~~downloadable from a communications network, and/or~~ stored on a computer-readable medium ~~and/or~~ and

executable by a microprocessor, ~~characterized in that it includes~~ comprising program code instructions for executing the routing method according to claim 1.

Claim 16 (currently amended): A non-transitory computer program product ~~downloadable from a communications network, and/or~~ stored on a computer-readable medium ~~and/or~~ and executable by a microprocessor, ~~characterized in that it includes~~ comprising program code instructions for executing the configuration method according to claim 7.

Claim 17 (currently amended): A non-transitory computer program product ~~downloadable from a communications network, and/or~~ stored on a computer-readable medium ~~and/or~~ and executable by a microprocessor, ~~characterized in that it includes~~ comprising program code instructions for executing the method according to claim 11.

## Remarks

The present application is a U.S. National Phase of a PCT patent application. The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase.

All of the changes are editorial and applicants believe no new matter is added thereby. The amendment, addition, and/or cancellation of claims is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
Mark Bergner, Reg. No. 45,877
DRINKER BIDDLE & REATH LLP
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Customer No.: 08968

Date: September 28, 2010

CH01/ 25606244.2

# ABSTRACT

A method of routing a data packet in a telecommunications network, said packet comprising a primary destination address and a destination port number. On reception of said packet, the following steps are executed: determining a port mask defining a range of port numbers to which the destination port number belongs; selecting an identifier of a destination piece of equipment of the packet from a plurality of equipment identifiers associated with said destination address on the basis of the port mask; and routing the packet to the destination piece of equipment on the basis of said identifier.

**PATENT**
Attorney Docket No. P3594US

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Mohamed Boucadair

Group Art Unit: Unassigned

Application No. Unassigned
(U.S. National Phase of PCT/FR2009/050548)

Examiner: Unassigned

Filed: September 28, 2010

For: A METHOD OF ROUTING A DATA PACKET IN A NETWORK AND AN ASSOCIATED DEVICE

## INFORMATION DISCLOSURE STATEMENT

Mail Stop PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Pursuant to 37 CFR 1.97 and 1.98, the references listed on the enclosed Form PTO-1449 and/or Substitute Form PTO-1449 ("Form 1449") are submitted for consideration by the Examiner in the examination of the above-identified patent application.

The full consideration of the references in their entirety by the Examiner is respectfully requested and encouraged. Also, it is respectfully requested that the references be entered into the record of the present application and that the Examiner place his or her initials in the appropriate area on the enclosed Form 1449, thereby indicating the Examiner's consideration of each of the references.

The submission of the references listed on the Form 1449 is for the purpose of providing a complete record and is not a concession that the references listed thereon are prior art to the invention claimed in the patent application. The right is expressly reserved to establish an invention date earlier than the above-identified filing date in order to remove any reference submitted herewith as prior art should it be deemed appropriate to do so.

Further, the submission of the references is not to be taken as a concession that any reference represents art that is material, relevant or analogous to the claimed invention. Accordingly, the right to argue that any reference is not properly within the scope of prior art relevant to an examination of the claims in the above-identified application is also expressly reserved.

The Information Disclosure Statement is being filed:

☒ **within** any one of the following time periods: (a) within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d); (b) within three months of the date of entry of the national stage as set forth in 37 CFR 1.491 of an international application; (c) before the mailing date

of a first Office Action on the merits; or (d) before the mailing of a first Office Action after the filing of a request for continued examination under 37 CFR 1.114.

☐ **after** (a), (b), (c) or (d) above, but before the mailing date of a final action under 37 CFR 1.113, a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and includes *one* of:

☐ the Statement under 37 CFR 1.97(e) (see "Statement under 37 CFR 1.97(e)" below).

*or*

☐ the fee of $180 set forth in 37 CFR 1.17(p) (see "Fees" below).

☐ **after** the mailing date of a final action under 37 CFR 1.113 or a Notice of Allowance under 37 CFR 1.311, or an action that otherwise closes prosecution in the application, and on or before payment of the issue fee, and includes the Statement under 37 CFR 1.97(e) (see "Statement under 37 CFR 1.97(e)" below), and the fee of $180 as set forth in 37 CFR 1.17(p) (see "Fees" below).

☐ **after** the mailing date of a Notice of Allowance under 37 CFR 1.311, and on or before payment of the issue fee, and **within** thirty days of receiving each item of information contained in the Information Disclosure Statement, and includes the Statement under 37 CFR 1.704(d) (see "Statement under 37 CFR 1.704(d)" below), and the fee of $180 as set forth in 37 CFR 1.17(p) (see "Fees" below).

NOTE: This is for original applications except applications for a design patent, filed on or after May 29, 2000, wherein a paper containing only an Information Disclosure Statement in compliance with 37 CFR 1.97 and 1.98 is being filed.

**Copies of the References**

☐ Copies of the references listed on the enclosed Form 1449 are enclosed herewith. Attached to each reference not in the English language is a concise explanation of the relevance pursuant to 37 CFR 1.98(a)(3).

☒ The filing date of the subject application is after June 30, 2003. Therefore, copies of U.S. patents and patent applications that are listed on the accompanying Form 1449 are not enclosed herewith in accordance with the U.S. Patent and Trademark Office's waiver of the requirement under 37 CFR 1.98 (see Official Gazette Notice of August 5, 2003). Copies of other references identified on the accompanying Form 1449 are enclosed herewith.

☒ Copy of the foreign search report is enclosed herewith.

☐ The references listed on the enclosed Form 1449 were previously identified in the parent application(s) of the present application, and copies of the references were furnished at that time. Accordingly, additional copies of the references are not submitted herewith, so as not to burden the file with duplicate copies of references. The Examiner is respectfully requested to carefully review the references in

accordance with the requirements set out in the Manual of Patent Examining Procedure. In accordance with 37 CFR 1.98(d), the details of the parent application(s) relied upon for an earlier filing date under 35 USC 120 in which copies of the references were previously furnished are set out below:

| U.S. APPLICATIONS | | Status *(check one)* | | |
|---|---|---|---|---|
| U.S. APPLICATIONS | U.S. FILING DATE | PATENTED | PENDING | ABANDONED |
| 1. | | | | |
| 2. | | | | |
| 3. | | | | |

**Statement under 37 CFR 1.97(e)**

☐ The **undersigned** hereby states that each item of information contained in the Information Disclosure Statement was first cited in any communication from a foreign patent office in a counterpart foreign patent application not more than three months prior to the filing of the Information Disclosure Statement.

☐ The **undersigned** hereby states that no item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign patent application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in the Information Disclosure Statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the Information Disclosure Statement.

**Statement under 37 CFR 1.704(d)**

☐ The **undersigned** hereby states that each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application and that this communication was not received by any individual designated in 37 CFR 1.56(c) more than thirty days prior to the filing of the Information Disclosure Statement.

**Fees**

☒ **No fee** is owed by the applicant(s).
☐ The **IDS Fee of $180** under 37 CFR 1.17(p) is enclosed herewith.

**Method of Payment of Fees**

☐ Attached is a check in the amount of $ .
☐ Charge Deposit Account No. 07-0181 in the amount of $ .

**Authorization to Charge Additional Fees**

☒ If any additional fees are owed in connection with this communication, please charge Deposit Account No. 07-0181.

**Instructions as to Overpayment**

☒ Credit Account No. 07-0181.
☐ Refund

Respectfully submitted,

/brian c. rupp/

Brian C. Rupp, Reg. No. 35,665
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(312) 569-1000 (telephone)
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Customer No.: 08968

Date: September 28, 2010

CH01/ 25606242.1

(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATIONEN MATIÈRE DE BREVETS (PCT)

(19) Organisation Mondiale de la Propriété Intellectuelle
Bureau international

(43) Date de la publication internationale
15 octobre 2009 (15.10.2009)

PCT

(10) Numéro de publication internationale
WO 2009/125158 A2

(51) Classification internationale des brevets :
*H04L 29/12* (2006.01) *H04L 12/66* (2006.01)
*H04L 12/28* (2006.01)

(21) Numéro de la demande internationale :
PCT/FR2009/050548

(22) Date de dépôt international :
31 mars 2009 (31.03.2009)

(25) Langue de dépôt : français

(26) Langue de publication : français

(30) Données relatives à la priorité :
0852108 31 mars 2008 (31.03.2008) FR

(71) Déposant *(pour tous les États désignés sauf US)* : **FRANCE TELECOM** [FR/FR]; 6, place d'Alleray, F-75015 Paris (FR).

(72) Inventeur; et

(75) Inventeur/Déposant *(pour US seulement)* : **BOUCADAIR, Mohamed** [FR/FR]; 124, rue Saint Jean, F-14000 Caen (FR).

(74) Mandataire : **FRANCE TELECOM R&D/PIV/BREVETS**; BENETIERE Marion, 38-40, rue du Général Leclerc, F-92794 Issy Les Moulineaux Cedex 9 (FR).

(81) États désignés *(sauf indication contraire, pour tout titre de protection nationale disponible)* : AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) États désignés *(sauf indication contraire, pour tout titre de protection régionale disponible)* : ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasien (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), européen (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

*[Suite sur la page suivante]*

(54) **Title** : METHOD OF ROUTING A DATA PACKET IN A NETWORK AND ASSOCIATED DEVICE

(54) **Titre** : PROCEDE DE ROUTAGE D'UN PAQUET DE DONNEES DANS UN RESEAU ET DISPOSITIF ASSOCIE

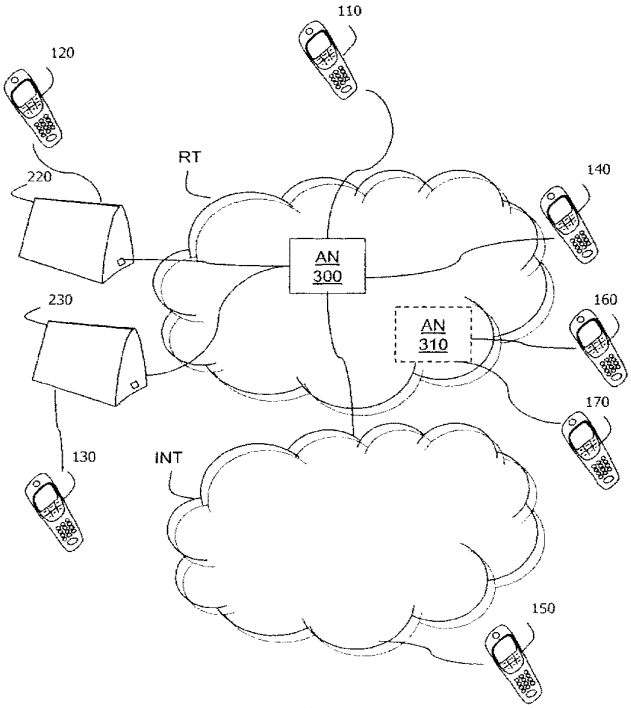



FIG. 3

(57) **Abstract** : The invention relates to a method of routing a data packet in a telecommunications network, said packet comprising a primary destination address and a destination port number. On receipt of said packet, the following steps are implemented: determination of a mask of ports defining a port number range to which the destination port number belongs; selection of an identifier of a destination apparatus for the packet from among a plurality of identifiers of apparatuses associated with said destination address on the basis of the ports mask; and routing of the packet to the destination apparatus on the basis of said identifier.

(57) **Abrégé** : L'invention concerne un procédé de routage d'un paquet de données dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination. Sur réception dudit paquet, les étapes suivantes sont mises en oeuvre : détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination; sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse de destination à partir du masque de ports; et routage du paquet vers l'équipement destinataire à partir dudit identifiant.

WO 2009/125158 A2

MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Déclarations en vertu de la règle 4.17** :

— *relative à la qualité d'inventeur (règle 4.17.iv))*

**Publiée** :

— *sans rapport de recherche internationale, sera republiée dès réception de ce rapport (règle 48.2.g))*

**Procédé de routage d'un paquet de données dans un réseau et dispositif associé**

**Domaine de l'invention**

Le domaine de l'invention est celui d'un réseau de télécommunications, en particulier un réseau de télécommunications IP dans lequel sont transportés des paquets de données d'un équipement source vers un équipement de destination identifié par une adresse de destination.

Un tel réseau de télécommunications groupe une pluralité d'équipements, de liens et de fonctions dédiés au transport des données issues d'équipements terminaux connectés à ce réseau. En particulier, les fonctions de transport peuvent être implémentées grâce à l'activation de protocoles de routage et de transmission. Un réseau de télécommunications administré par un opérateur est encore appelé un domaine.

Un fournisseur de service de connectivité IP déploie une architecture dédiée pour permettre aux utilisateurs d'équipements terminaux d'être joignables. L'accès au service de connectivité IP est géré par le fournisseur de service qui s'appuie sur le réseau de télécommunications d'un opérateur pour router les paquets de données émis par les équipements terminaux vers leur destination finale. Dans certains cas, ledit fournisseur de service est aussi l'opérateur de réseau de télécommunications.

L'invention concerne un mécanisme d'allocation d'adresses et de numéros de ports permettant d'affecter une même adresse primaire à une pluralité d'équipements terminaux du réseau de télécommunications.

Ainsi, l'invention s'applique à tout type d'adressage, public ou privé, mais de façon privilégiée mais non limitative aux adresses IP publiques définies par le protocole IPv4 (Internet Protocol version 4).

Une passerelle domestique placée en coupure de flux de paquets de données entre un terminal d'un réseau domestique privé et le réseau de télécommunications public d'un opérateur, qu'on appelle aussi domaine, comporte, de façon connue, une table dans laquelle elle associe l'adresse IP privée et le port associé à ce terminal, avec une adresse IP publique de type IPv4 et un port de cette même passerelle sur le réseau public.

Cette table est connue de l'homme du métier sous l'appellation "table de nattage", cette expression venant de l'acronyme NAT (*Network Address Translation* en anglais).

Il est communément admis par la communauté des fournisseurs de service IP que l'épuisement des adresses IPv4 publiques est une fatalité. Pour éviter ce problème, la communauté s'est mobilisée dans le passé, ce qui a conduit à la définition d'un nouveau protocole IPv6 (*Internet Protocol version 6*), qui offre un grand nombre d'adresses IP et un mécanisme de routage hiérarchique aux performances améliorées. Néanmoins, cette solution n'est en pratique pas activée par les opérateurs, pour des raisons financières ou stratégiques. Ces mêmes fournisseurs ne sont toutefois pas indifférents aux alarmes récemment émis par l'IETF (*Internet Engineering Task Force*), notamment dans des rapports présentés au sein du groupe de travail GROW (*Global Routing Operations Working Group)* concernant un risque d'épuisement des adresses IPv4 de l'IANA fin 2009.

Pour limiter le nombre d'adresses publiques IPv4 nécessaire pour la fourniture d'un service de connectivité IP, une solution de double NAT, appelée aussi NAT opérateur, a été proposée et implémentée. Elle consiste à activer une fonction NAT au sein du réseau de télécommunications de l'opérateur, de telle sorte que les passerelles domestiques utilisent un adressage privé dans leur table de Nattage. En relation avec la **figure 1**, on considère un équipement terminal 120 dans un réseau domestique RD connecté à une passerelle domestique 220 placée en coupure de flux entre l'équipement terminal et un réseau de télécommunications RT. La passerelle met en œuvre une première fonction de NAT NAT1 qui traduit un premier couple d'adressage privé d'un paquet de données PT émis par l'équipement terminal 120 en un deuxième couple d'adressage privé (@PRIV2, P2). Elle émet ensuite le paquet PT transformé dans le réseau RT. Ce paquet est reçu par un équipement NO du réseau. Cet équipement NO met en œuvre une fonction de NAT opérateur NAT2 qui traduit le deuxième couple d'adressage privé (@PRIV2, P2) du paquet de données PT en un troisième couple d'adressage publique (@PUB3, P3). Ainsi, c'est la fonction de NAT de l'opérateur qui assure la traduction des adresses privées des passerelles domestiques

vers des adresses publiques, ce qui permet d'économiser un nombre non négligeable d'adresses publiques IPv4.

**Inconvénients de la technique antérieure**

La solution de NAT Opérateur présente des inconvénients, parmi lesquels :

- une complexification de l'acheminement des paquets de données IP : du fait de l'introduction d'un deuxième niveau de traduction d'adresses, les paquets de données doivent être modifiés deux fois;
- la nécessité d'adapter la mise en œuvre de protocoles de signalisation applicative ou ALG (*Application Level Gateway*) conventionnels tels que DNS (*Domain Name System*), FTP (*File Transfer Protocol*) ou encore SIP (*Session Initiation Protocol*). Dans le cas de SIP par exemple, l'établissement et le maintien d'une session de voix sur IP, nécessite que, pour maintenir à jour sa table de Nattage, la passerelle domestique placée en coupure du flux de signalisation SIP force artificiellement, de façon connue, les échanges de signalisation entre le terminal de l'abonné et le réseau public, en imposant une fréquence élevée des requêtes de réenregistrements. En présence d'un double NAT, un tel mécanisme doit aussi être prévu au niveau de l'équipement qui héberge la fonction de NAT Opérateur; et
- une dégradation du service de connectivité IP offert par l'opérateur du réseau public de télécommunications doit être déplorée, notamment parce que des fonctionnalités telles que le "*port forwarding*" ou le *DynDNS* ne peuvent pas être supportées en présence du NAT opérateur.

**Objectifs de l'invention**

Il existe donc un besoin de pallier ces inconvénients de l'art antérieur.

Plus précisément, il existe un besoin de fournir une nouvelle solution pour économiser l'usage d'adresses IP publiques, sans entraîner de dégradation du service rendu au terminal client.

**Exposé de l'invention**

L'invention répond à ce besoin à l'aide d'un procédé de routage d'un paquet de données dans un réseau de télécommunications, ledit paquet comprenant une adresse

primaire de destination et un numéro de port de destination, ledit procédé comprenant, sur réception dudit paquet, les étapes suivantes :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant de routage d'un équipement destinataire du paquet parmi une pluralité d'identifiants de routage d'équipements terminaux associés à ladite adresse de destination à partir du masque de ports déterminé; et
- routage du paquet vers l'équipement terminal destinataire à partir dudit identifiant.

Corrélativement, l'invention concerne un dispositif de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit dispositif est apte à mettre en œuvre, sur réception dudit paquet, les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement terminal destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et
- routage du paquet vers l'équipement terminal destinataire à partir dudit identifiant.

Ainsi, l'invention repose sur une approche tout à fait nouvelle et inventive du routage d'un paquet de données, qui s'appuie sur une combinaison unique constituée de l'adresse de destination du paquet, du masque de ports définissant une plage de numéros de ports qui inclut le numéro de port de destination du paquet reçu et d'un identifiant de routage de l'équipement terminal de destination. L'invention permet donc d'affecter une même adresse primaire et routable dans le réseau de télécommunications, à plusieurs équipements terminaux connectés à ce réseau et donc d'économiser l'usage des adresses IP publiques, sans avoir recours à la solution de NAT opérateur. L'invention constitue donc une solution simple, efficace et dans la continuité des pratiques courantes dans le domaine à l'épuisement des adresses IPv4.

Elle permet à un fournisseur d'augmenter son parc de clients de manière significative. Elle ne nécessite pas d'investissements conséquents et permet donc une optimisation de CAPEX (Capital Expenditures) et de l'OPEX (Operative Expenditures),

L'invention s'applique au routage de paquets de données à destination de tout type d'équipement terminal, qu'il soit connecté ou non à un réseau domestique en particulier et de façon non limitative à une passerelle domestique placée en coupure de flux entre un réseau domestique et un réseau de télécommunications public.

Le procédé de routage selon l'invention est mis en œuvre par un équipement du réseau de télécommunications. Par conséquent, l'invention vise aussi un équipement dans un réseau de télécommunications, apte à recevoir un paquet de données comprenant une adresse de destination et un numéro de port de destination, ledit équipement comprenant un dispositif de routage selon l'invention.

Un tel équipement est donc placé en coupure de tous les flux de données adressés à l'équipement terminal. Il peut s'agir d'un routeur ou d'un équipement dédié du réseau de télécommunications.

De façon avantageuse, l'adresse primaire est une adresse publique. Un avantage de l'utilisation d'un adressage public est d'éviter les traductions d'adresses et les corrections protocolaires à la périphérie d'un domaine administré par un fournisseur de service.

Selon un premier mode de réalisation de l'invention, ledit au moins un identifiant est une adresse secondaire de l'équipement terminal destinataire. Une telle adresse secondaire, aussi appelée adresse privée, n'est pas routable dans tout le réseau de télécommunications. Elle a une portée restreinte, limitée aux échanges de flux entre l'équipement terminal et l'équipement du réseau de télécommunications mettant en œuvre le procédé selon l'invention. Cette adresse n'est pas annoncée au delà du domaine BGP (Border Gateway Protocol) du réseau de télécommunications d'un opérateur donné.

De façon avantageuse, le procédé comprend en outre, préalablement à l'étape de routage, une étape de transformation du paquet pour y ajouter ladite adresse secondaire et le paquet est routé vers l'équipement terminal destinataire à partir de

ladite adresse secondaire.

Selon un aspect du premier mode de réalisation de l'invention, l'étape de transformation consiste en à encapsuler le paquet dans un autre paquet destiné à ladite adresse secondaire.

Un avantage de cette encapsulation est qu'elle ne nécessite pas la modification de la structure interne du paquet. Ainsi, toute opération d'écriture et de calcul d'un nouveau checksum est évitée.

Selon un autre aspect du premier mode de réalisation de l'invention, l'étape de transformation consiste à ajouter l'adresse secondaire de l'équipement destinataire dans un champ du paquet.

Un premier avantage est qu'une telle transformation permet d'optimiser l'utilisation de la bande passante, car elle ne nécessite par l'ajout de deux en-têtes comme le processus d'encapsulation. Un deuxième avantage est qu'elle exploite l'option de routage à la source (source routing ) du protocole IP, par exemple.

Selon un deuxième mode de réalisation de l'invention, l'identifiant est un identifiant de route spécifique à cet équipement terminal et le routage du paquet est effectué à partir dudit identifiant de route spécifique. On entend ici par route spécifique, une route dédiée pour joindre cet équipement et qui ne dessert que cet équipement terminal parmi la pluralité d'équipements possédant la même adresse primaire.

Combinée à l'adresse primaire et au masque de ports affecté à l'équipement terminal de destination, cet identifiant de route spécifique permet d'une part d'identifier de façon unique cet équipement et, d'autre part, de router le paquet de données reçu.

Un avantage est qu'aucune transformation du paquet n'est nécessaire. Ce mode de réalisation de l'invention nécessite une ingénierie du réseau de télécommunications sous-jacent de l'opérateur pour pouvoir installer dans l'équipement qui met en œuvre l'invention des routes disjointes vers des équipements ayant la même adresse primaire.

Dans un mode particulier de réalisation, les différentes étapes du procédé de routage d'un paquet de données sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans un dispositif de routage ou plus généralement dans un ordinateur, ce programme comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de routage tel que décrit ci-dessus.

Ce programme peut utiliser n'importe quel langage de programmation, et être sous la forme de code source, code objet, ou de code intermédiaire entre code source et code objet, tel que dans une forme partiellement compilée, ou dans n'importe quelle autre forme souhaitable.

L'invention vise aussi un support d'informations lisible par un ordinateur, et comportant des instructions d'un programme d'ordinateur tel que mentionné ci-dessus.

Le support d'informations peut être n'importe quelle entité ou dispositif capable de stocker le programme. Par exemple, le support peut comporter un moyen de stockage, tel qu'une ROM, par exemple un CD ROM ou une ROM de circuit microélectronique, ou encore un moyen d'enregistrement magnétique, par exemple une disquette (floppy disc) ou un disque dur.

D'autre part, le support d'informations peut être un support transmissible tel qu'un signal électrique ou optique, qui peut être acheminé via un câble électrique ou optique, par radio ou par d'autres moyens. Le programme selon l'invention peut être en particulier téléchargé sur un réseau de type Internet.

Alternativement, le support d'informations peut être un circuit intégré dans lequel le programme est incorporé, le circuit étant adapté pour exécuter ou pour être utilisé dans l'exécution du procédé en question.

L'invention concerne également un procédé de configuration d'un équipement terminal connecté à un réseau de télécommunications, comprenant, sur réception d'une requête de configuration émise par ledit équipement, les étapes suivantes :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux ; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et

- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

Une pluralité d'équipements terminaux configurés selon l'invention reçoit la même adresse primaire. C'est la combinaison de cette adresse primaire, de l'identifiant de routage et du masque de ports qui permet de les identifier individuellement de façon unique.

Selon un aspect de l'invention, le procédé de configuration comprend une étape d'affectation d'un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal et le message de configuration comprend en outre ledit identifiant de dispositif de routage.

De cette manière, l'équipement terminal connaît l'identité du dispositif de routage des paquets de données qui lui sont destinés.

Selon un aspect de l'invention, ledit message de configuration est envoyé en outre à un équipement du réseau de télécommunications comprenant un dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal

Le procédé de configuration selon l'invention est mis en œuvre par un serveur de configuration dans un réseau de télécommunications, apte, sur réception d'une requête de configuration émise par un équipement terminal, à mettre en œuvre les moyens suivants :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et

-affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et

- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

L'invention concerne aussi un procédé de mise en œuvre d'une configuration par un équipement terminal connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de

configuration parmi lesquelles une adresse primaire, un masque de port définissant une plage de numéros qui lui est dédiée et un identifiant de routage, ledit procédé comprend les étapes suivantes :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

Selon un aspect de l'invention, le procédé de mise en œuvre d'une configuration comprend en outre une étape d'envoi des données de configuration à un dispositif de routage d'un paquet de données selon l'invention.

Ce dispositif de routage est le dispositif d'attachement de l'équipement terminal. Il voit passer tous les paquets de données destinés à l'équipement terminal.

Selon un autre aspect de l'invention, sur réception d'un paquet de données comprenant une adresse de destination, un numéro de port et un identifiant de routage, ledit procédé comprend en outre une étape de vérification d'une appartenance du numéro de port à la plage de numéros définie par son masque de port et une étape de rejet dudit paquet si la vérification est négative.

Le procédé de mise en œuvre d'une configuration est avantageusement mis en œuvre par un équipement terminal client connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire partagée avec une pluralité d'équipements terminaux, un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage, il est apte à mettre en œuvre les moyens suivants :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse

source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

Dans un mode particulier de réalisation, les différentes étapes du procédé de mise en œuvre d'une configuration sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans une passerelle domestique ou plus généralement dans un ordinateur, ce programme comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de mise en œuvre d'une configuration tel que décrit ci-dessus.

L'invention concerne en outre un procédé de traduction d'adresses d'un paquet de données reçu par une passerelle domestique placée en coupure de flux entre un équipement terminal émetteur dudit paquet et un équipement terminal destinataire dudit paquet dans un réseau de télécommunications, ledit paquet comprenant une première adresse et un premier numéro de port de l'équipement terminal émetteur, ledit procédé étant caractérisé en ce qu'il comprend une étape de remplacement de ladite première adresse et du premier numéro de port par une adresse primaire et un deuxième numéro de port, ledit deuxième numéro de port appartenant à une plage de numéros dédiée à ladite passerelle et déterminée par un masque de numéros de ports.

Lorsqu'un équipement terminal se trouve dans un réseau domestique géré par une passerelle domestique, la passerelle domestique configurée selon l'invention met en œuvre un mécanisme de traduction d'adresses, qui consiste non seulement à remplacer la première adresse de l'équipement terminal par son adresse primaire, mais aussi à sélectionner un numéro de ports dans sa plage dédiée.

Dans un mode particulier de réalisation, les différentes étapes du procédé de traduction d'adresses d'un paquet de données sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans une passerelle domestique ou plus généralement dans un ordinateur, ce programme

comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de traduction d'adresses tel que décrit ci-dessus.

**Liste des figures**

D'autres avantages et caractéristiques de l'invention apparaîtront plus clairement à la lecture de la description suivante d'un mode de réalisation particulier de l'invention, donné à titre de simple exemple illustratif et non limitatif, et des dessins annexés, parmi lesquels :

- la figure 1, déjà décrite, présente de façon schématique un réseau de télécommunication mettant en œuvre la fonction de NAT opérateur selon l'art antérieur;
- les figures 2A et 2B présentent deux exemples de masques de numéros de port selon l'invention;
- la figure 3 présente de façon schématique une pluralité d'équipements terminaux connectés à un réseau de télécommunications d'un opérateur selon l'invention;
- la figure 4 présente un procédé de routage d'un paquet de données dans un réseau de télécommunications selon l'invention;
- la figure 5 présente un équipement du réseau de télécommunications mettant en œuvre le procédé de routage selon l'invention, dans son environnement;
- la figure 6 présente de façon schématique un mode de réalisation de l'invention, selon lequel l'identifiant de routage est un identifiant de route dédiée à l'équipement terminal destinataire du paquet de données;
- la figure 7 présente de façon schématique le procédé de configuration d'un équipement terminal selon l'invention;
- la figure 8 présente de façon schématique un équipement terminal mettant en œuvre le procédé de mise en œuvre d'une configuration selon l'invention, dans son environnement;
- la figure 9 présente un procédé de mise en œuvre d'une configuration d'un équipement terminal selon l'invention; et
- la figure 10 présente de façon schématique une passerelle domestique mettant

en œuvre le procédé de mise en œuvre d'une configuration selon l'invention, dans son environnement.

**Description d'un mode de réalisation particulier de l'invention**

Le principe général de l'invention repose sur l'affectation d'une même adresse primaire à une pluralité d'équipements terminaux dans un réseau de télécommunications, ces équipements terminaux étant identifiés de façon unique à partir d'un identifiant de routage et d'un masque de port définissant une plage de numéros de ports qui leur est dédiée.

On notera que le terme d'équipement terminal est général et désigne aussi bien un équipement terminal directement connecté au réseau de télécommunications qu'une passerelle domestique.

Les inventeurs ont constaté qu'un équipement terminal n'utilise pas simultanément les $2^{16}$ (i.e. 65536) valeurs de numéros de ports dont il dispose. Cette plage est en effet surdimensionnée pour les besoins réels d'un client, qui n'utilise que quelques connexions pour des applications de type P2P (*Peer to Peer*), FTP (*File Transfer Protocol*), web browsing, téléphonie, etc.

L'invention consiste à réduire la plage de numéros de ports disponibles pour un équipement terminal par application, en affectant à un équipement terminal un masque de ports définissant une sous partie de cette plage. Le masque de port ainsi attribué à un équipement terminal particulier est utilisé, en combinaison avec son adresse IP primaire, pour router les paquets de données qui lui sont destinés, sans dégradation du service IP..

On notera qu'un fournisseur de service de connectivité IP doit respecter la contrainte suivante, à savoir que deux équipements terminaux ayant la même adresse primaire doivent nécessairement recevoir des masques de ports distincts.

Le fournisseur de service de connectivité peut, par exemple, forcer la valeur du bit de poids fort du champ correspondant au numéro de port source des paquets de données IP émis par un équipement terminal donné. Cet équipement dispose alors

d'un masque de ports définissant une plage de 32768 valeurs de numéros de ports possibles.

Le fournisseur peut, selon une variante, forcer la valeur des huit premiers bits de poids fort, de façon à ce que l'équipement terminal dispose d'une plage de 256 numéros de ports utilisables.

Un numéro de port reste donc codé sur un champ de 16 bits, mais avec une partie du champ forcé par le fournisseur de service de connectivité IP. En relation avec les figures 2A et 2B, on présente deux exemples de masques de numéros de ports selon l'invention: un exemple de masque de type contigu et un exemple de type non contigu

- Un masque contigu est un masque qui utilise un ensemble adjacent de bits (représentation binaire du champ port). Cette variante est simple à mettre en œuvre et ne requiert pas d'intelligence de traitement et d'implémentation pour les équipements mettant en œuvre l'invention. La plage associée à un masque contigu est une plage continue et unique. Les valeurs autorisées sont comprises dans un seul intervalle.
- Un masque non contigu est un masque qui utilise des bits non adjacents. La plage de ports résultante peut être définie par l'union de plusieurs « petite » plage continue. L'avantage de cette deuxième variante est la possibilité d'affecter la plage des ports par défaut à plusieurs équipements terminaux en même temps.

On présente, en relation avec la **figure 3,** un réseau de télécommunications RT d'un opérateur sur lequel un fournisseur de service a déployé une architecture de service de connectivité ou d'accès IP. Une pluralité d'équipements terminaux disposent d'un accès à ce réseau. Dans la suite, on désignera par équipement terminal aussi bien les équipements terminaux 110, 120, 130, 140, 160, 170 tels que, par exemple, des téléphones ou des ordinateurs personnels, connectés directement au réseau RT qu'une passerelle domestique 230, 220 placée en coupure de flux entre un réseau domestique et le réseau de télécommunications RT.

Une telle passerelle dispose d'une table de traduction d'adresses ou table de Nattage, qui fait correspondre à une adresse privée et un premier numéro de port d'un équipement terminal de son réseau privé au moins sa propre adresse publique et un deuxième numéro de port.

De façon avantageuse, le réseau de télécommunications RT de l'opérateur comprend au moins un dispositif de routage AN 300 mettant en œuvre le procédé de routage d'un paquet de données selon l'invention. On notera qu'il peut en comprendre plusieurs autres, tels que le dispositif de routage 310.

Ce procédé de routage va maintenant être décrit en relation avec la **figure 4**. Sur réception d'un paquet de données PT comprenant une adresse publique de destination @PUB et un numéro de port de destination P2, le procédé de routage selon l'invention met en œuvre une étape E1 de détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port P2. Les masques de ports affectés aux équipements terminaux du réseau peuvent avantageusement être stockés dans une base de données BD1. En E2, ce masque de ports MP est utilisé pour sélectionner un équipement destinataire du paquet PT parmi une pluralité d'équipements terminaux ayant la même adresse publique P2, et l'identifier à l'aide de son identifiant de routage IDR. Le paquet est ensuite routé en E3 vers l'équipement destinataire sélectionné à partir de son identifiant de routage IDR. Si le dispositif de routage AN 300 ne dispose pas d'entrée dans ses tables de routage, le paquet en question est supprimé.

Dans le mode de réalisation décrit en relation avec la **figure 5**, le dispositif de routage AN 300 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 310, une mémoire vive de type RAM 320, une mémoire morte de type ROM 330 et des moyens 340 de télécommunications avec le réseau 1.

Conformément à l'invention, le dispositif de routage AN 300 comporte une mémoire 350 comprenant une base de données dans laquelle il sauvegarde l'association entre l'adresse publique @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi

bien être externe au dispositif pourvu qu'il puisse y accéder pour récupérer les données d'identification de l'équipement terminal destinataire du paquet de données reçu.

La mémoire morte 330 constitue un support d'enregistrement conforme à l'invention. Ce support mémorise un programme d'ordinateur conforme à l'invention, ce programme comportant des instructions pour l'exécution des étapes du procédé de routage conforme à l'invention qui vient d'être décrit en référence à la **figure 4.**

Le dispositif de routage AN selon l'invention a pour principale fonction de maintenir une table de correspondance entre l'identifiant de routage IDR et le couple (adresse IP publique @PUB, masque de ports MP) de façon à pouvoir déterminer de façon non ambigüe à quel équipement terminal doit être transmis le paquet de données comprenant l'adresse de destination @PUB partagée par plusieurs équipements terminaux. Le dispositif AN peut être localisé dans un PoP (*Point of Presence*) d'accès au réseau de télécommunications RT ou être centralisé. Il peut être hébergé par un routeur ou par un équipement dédié.

L'adresse primaire *@PUB* d'un équipement terminal est annoncée par le dispositif de routage AN, par exemple à l'aide du protocole de routage intra-domaine IGP (Interior Gateway Protocol, en anglais) tels que RIP (Routing Information Protocol), IS-IS ( Intermediate System to Intermediate System) ou OSPF (Open Shortest Path First). Ceci permet de forcer le passage des paquets IP destinés à toute adresse IP publique, affectée comme adresse principale à au moins deux équipements terminaux.

Selon un premier mode de réalisation de l'invention, l'identifiant de routage IDR est une adresse privée ou encore appelé secondaire de l'équipement terminal. Une telle adresse n'est pas annoncée par le dispositif de routage AN. Par conséquent, elle n'est pas routable dans le cœur de réseau RT. Elle n'est pas non plus joignable depuis internet. Dans le cas où le dispositif AN se trouve dans un POP d'accès au réseau RT, sa portée est limitée aux échanges entre l'équipement terminal et les équipements constituants ledit POP.

En relation avec la **figure 6**, on présente maintenant un deuxième mode de réalisation du procédé de routage selon l'invention. Selon ce mode de réalisation,

l'identifiant de routage IDR est un identifiant de route dédiée à l'équipement terminal. Un tel identifiant désigne de façon unique une route qui dessert l'équipement terminal de façon unique et non ambigüe. Ceci est réalisable part exemple à l'aide de routes disjointes. Deux routes R1 et R2 sont dites disjointes si aucun des nœuds constituants la route R1 dans le réseau de l'opérateur n'est traversé au titre de la route R2. Ainsi, les routes R1 et R2 sont constituées par une succession de nœuds, aucun de ces nœuds n'étant partagé entre ces deux routes. Pour ce faire, la topologie du réseau de télécommunications sous jacent doit être construite de telle façon à permettre l'installation de routes disjointes dans la table de routage maintenue par le dispositif de routage AN selon l'invention.

On comprend que, selon l'invention, l'équipement terminal 100 et le dispositif de routage AN 300 doivent être configurés préalablement à toute connexion au réseau.

Le procédé de configuration d'un équipement terminal selon l'invention va maintenant être décrit en relation avec la **figure 7**. Lorsqu'il se connecte au réseau de télécommunications RT de l'opérateur, par exemple suite à sa mise sous tension, l'équipement terminal 100, 200, 210, 220, 130, envoie de façon connue, une requête de configuration au service de connectivité IP du fournisseur de service. Une telle requête RQ-CONF est reçue par un serveur de configuration SC qui lui fournit en retour les données de configuration nécessaires à la mise en œuvre de son service de connectivité IP.

Il peut s'agir, par exemple, d'une requête DHCP_DISCOVER() selon le protocole DHCP diffusée en mode *broadcast* dans le réseau de télécommunications du fournisseur de service IP. Ce message peut être relayé par un client relais DHCP (*DHCP Client Relay*) ou être reçu directement par un serveur de configuration DHCP. Sur réception de ce message, un serveur de configuration DHCP répond à l'émetteur du message DHCP_DISCOVER() par un message dédié DHCP_OFFER() contenant un bail DHCP.

Selon l'invention, le procédé de configuration mis en œuvre par le serveur de configuration SC sur réception de la requête de configuration RQ-CONF. Une étape E"1 consiste à affecter une adresse publique audit équipement terminal, ladite adresse

publique étant partagée avec une pluralité d'équipements terminaux. Une étape E"2 consiste ensuite à affecter audit équipement terminal un masque de ports MP définissant une plage de numéros qui lui est dédiée et un identifiant de routage IDR. De telles données de configuration @PUB, IDR et MP sont enfin envoyées audit équipement terminal dans un message de configuration MESS-CONF..

Selon un aspect de l'invention, le serveur de configuration désigne un dispositif de routage AN 300 d'attachement pour l'équipement terminal. Les données de configuration sont aussi envoyées à ce dispositif de routage AN 300 par le serveur de configuration SC. Dans ce cas, le message de configuration MESS-CONF comprend en outre un identifiant du dispositif de routage d'attachement AN 300.

Lorsque la configuration se fait auprès d'un serveur DHCP, le message de configuration MESS-CONF est une offre de type DHCP_OFFER() qui contient les données de configuration IP relatives à la configuration de l'équipement terminal en ayant fait la demande. De telles données comportent au moins les éléments suivants:

- une adresse secondaire IPV4 @PRIV;
- une adresse primaire IPV4 @PUB ;
- un masque de port MP, qui fait l'objet d'une nouvelle option DHCP selon le format suivant ;

| Code | Len | Val |
|---|---|---|
| TBA | variable | MP |

  - *Code* : ce champ renseigne le code de l'option. La valeur de ce champ doit être attribuée par IANA (*Internet Assigned Numbers Authority*). La longueur de ce champ est de 1 octet;
  - *Len* : Ce champ renseigne la longueur de la valeur de l'option. Dans le cas de l'option masque de ports, la valeur de ce champ est égale à "variable" ;
  - *Val* : Ce champ renseigne la valeur du masque de ports. Cette valeur est codée comme le champ "port" des protocoles de transport IP. La

valeur MP est utilisée pour déterminer la plage des numéros de ports utilisables par une passerelle domestique.

- L'identifiant de dispositif de routage AN d'attachement peut être dans ce cas, un identifiant a.b.c.d égal à son adresse IP ou à son nom de domaine FQDN (*Fully Qualified Domain Name*). Il fait lui aussi l'objet d'une nouvelle option DHCP.

Le format de l'option de dispositif de routage d'attachement (DAN) est le suivant :

| Code | Len | Val |
|---|---|---|
| TBA | 4 | DAN |

- *Code* : ce champ renseigne le code de l'option. La valeur de ce champ doit être attribuée par IANA (*Internet Assigned Numbers Authority*). La longueur de ce champ est de 1 octet;
- *Len* : Ce champ renseigne la longueur de la valeur de l'option. Dans le cas de l'option dispositif de routage d'attachement (DAN), la valeur de ce champ est égale à "4" ;
- *Val* : Ce champ renseigne la valeur du paramètre DAN. Cette valeur est codée sous forme d'une adresse IP.

Les serveurs de configuration DHCP doivent être modifiés pour mettre en œuvre l'invention et notamment affecter ces nouvelles données de configuration à tout équipement terminal, par exemple une passerelle domestique, demandant un accès de connectivité IP.

Dans le mode de réalisation décrit en relation avec la **figure 8**, le serveur de configuration SC 400 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 410, une mémoire vive de type RAM 420, une mémoire morte de type ROM 430 et des moyens 440 de télécommunications avec le réseau 1.

Conformément à l'invention, le serveur de configuration SC 400 comporte une mémoire 450 comprenant une base de données dans laquelle il sauvegarde les données de configuration des équipements terminaux qu'il gère, notamment l'association entre l'adresse primaire @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi bien être externe au serveur de configuration pourvu qu'il puisse y accéder pour récupérer les données de configuration de l'équipement terminal émetteur de la requête de configuration.

En réponse à une requête de configuration envoyée au serveur de configuration SC 400, l'équipement terminal selon l'invention reçoit le message de configuration MESS-CONF comprenant les données de configuration de sa connectivité IP au réseau de télécommunications RT. Sur réception de ce message, il exécute le procédé de mise en œuvre d'une configuration selon l'invention, qui va maintenant être décrit en référence à la **figure 9**. Dans une étape E"1, il enregistre les données de configurations reçues dans une base de données BDT. Lorsqu'il souhaite envoyer un paquet de données PT dans le réseau de télécommunications RT, il sélectionne en E"3 un port P2 dans la plage de numéros de ports définie par le masque de ports PT et affecte au paquet de données PT un port source correspondant au port P2.

Sur réception d'un paquet de données PT' en provenance du réseau de télécommunications, il met en œuvre une étape E"4 de vérification d'une appartenance d'un port P'2 dudit paquet au masque de port MP et rejette le paquet en E"5 si la vérification est négative.

Selon une variante, il comprend en outre une étape E"2 d'envoi des données de configuration à l'équipement AN 300 du réseau de télécommunications RT comprenant le dispositif de routage selon l'invention.

On comprend donc que le dispositif de routage selon l'invention peut être configuré soit par l'intermédiaire de l'équipement terminal, soit directement par le serveur de configuration SC 400.

Le premier cas s'applique, lorsque l'identifiant de routage IDR est une adresse secondaire @PRIV. L'équipement terminal, après avoir activé la nouvelle configuration reçu dans le message de configuration MESS-CONF, qui peut être un bail DHCP, génère un message de configuration, que nous appelons BIND(), destiné au dispositif de routage AN selon l'invention. Ce dispositif est identifié par l'adresse DAN dans le message MESS-CONF. Le message BIND(@PRIV, @PUB, MP) comprend au moins l'adresse principale de l'équipement terminal, son identifiant de routage IDR et son masque de ports. De façon avantageuse, il comprend en outre un identifiant du dispositif de routage apte à router vers l'équipement terminal les paquets de données qui lui sont destinés. Il est émis par l'équipement terminal avec une adresse source égale à @PRIV. Sur réception de ce message, le dispositif de routage AN envoie un acquittement à l'équipement terminal émetteur à l'aide d'un message d'acquittement.

Lorsque l'identifiant de routage IDR est un identifiant de route dédiée à l'équipement terminal, deux variantes pour l'envoi du message BIND() peuvent être envisagées. Dans les deux cas, le serveur de configuration SC connaît l'ensemble des routes maintenues par le dispositif de routage AN :

- Selon la première, le message BIND() est avantageusement transmis au dispositif de routage AN par le serveur de configuration SC. On notera que, dans ce deuxième cas, le serveur de configuration envoie le message BIND() et que ce message comprend l'adresse principale @PUB, le masque de port MP et l'identifiant de la route à utiliser. Sur réception de ce message, le dispositif de routage selon l'invention associe, en consultant sa table de routage avec routes disjoints préinstallées, un identifiant de route spécifique à l'équipement IDR et (@PUB, MP) reçu.
- Selon la deuxième, l'identifiant de la route à utiliser est envoyé par SC au même titre que @PUB et MP. Le terminal envoie un message BIND() contenant les informations suivantes : @PUB, MP et IDR. Néanmoins, noue ne recommandons pas cette deuxième variante car le client ne doit pas être au courant des politiques de routage telles que installées par le fournisseur de service.

En relation avec la **figure 8**, on considère le contenu des messages BIND() envoyés au dispositif de routage AN 300 par les équipements terminaux suivants :

- L'équipement terminal 110 envoie le message BIND(@PUB1, MP1, IDR1);
- La passerelle domestique 220 de l'équipement terminal 120 envoie le message BIND(@PUB2, MP2, IDR2);
- La passerelle domestique 230 de l'équipement terminal 130 envoie le message BIND(@PUB3, MP3, IDR3);
- L'équipement terminal 140 envoie le message BIND(@PUB4, MP4, IDR4).

Une fois le message BIND() reçu par le dispositif de routage AN selon l'invention, ce dernier procède à l'instanciation d'une nouvelle entrée dans une table d'associations (ou de *bindings*). Ladite table permet de déterminer sans ambiguïté parmi l'ensemble de machines gérées par le dispositif de routage AN et ayant la même adresse principale @ PUB, celle vers laquelle il faut transmettre un message destinée à ladite adresse IP donnée (i.e. @PUB) ayant été affectée comme adresse principale.

Pour ce faire, le dispositif de routage AN maintient l'association (IDR, (@PUB, MP)).

Dans le cadre de l'exemple de la **figure 8**, la table des associations contient les associations suivantes :

- IDR1, (@PUB, MP1)
- IDR2, (@PUB, MP2)
- IDR3, (@PUB, MP3)
- IDR4, (@PUB, MP1)

Dans une variante d'implémentation, la signature du message BIND() peut contenir une durée de vie telle que renseignée dans le bail DHCP. De plus, une association installée dans la table des association peut être rafraichie à l'aide d'autres messages BIND(). Si aucune mise à jour n'est reçue avant l'écoulement de la durée de vie, l'entrée correspondante est supprimée de la liste (une marge de précision peut être envisagée).

Dans une autre variante, le message BIND() peut être envoyé par le serveur de configuration 400 SC et non pas par l'équipement terminal qui vient d'être configuré. Les informations requises par l'installation d'une nouvelle entrée dans la table des

associations peuvent être transmises directement par le fournisseur de service au dispositif de routage AN 300 via le serveur de configuration SC 400.

En relation avec la figure 8, on considère l'exemple d'un paquet de données PT (@PUB, P2) émis par l'équipement terminal 110 à destination de l'équipement terminal 120. A la réception de ce paquet destiné à une adresse principale IP @PUB, le dispositif de routage AN procède à la lecture du numéro de port de destination P2 dudit message et déduit le masque de port MP2 correspondant. A l'aide de ce masque et de l'adresse principale @PUB, le dispositif de routage AN détermine, en parcourant sa table des associations, l'identifiant de routage IDR2, par exemple l'adresse secondaire @PRIV2 associée au couple (@PUB, MP2).

Après détermination de l'adresse secondaire, le dispositif de routage AN transforme le paquet IP reçu en un paquet PT'(@PUB, P2, IDR2). Pour des raisons de sécurité, le numéro de port destination à utiliser pour ce paquet PT' est négocié entre l'équipement terminal 120 et le dispositif de routage AN.

On notera que le paquet PT peut être transformé de diverses façons. Selon un premier mode de réalisation, il est encapsulé dans un paquet PT' comprenant, par exemple, comme adresse de destination l'adresse secondaire @PRIV2 de l'équipement terminal destinataire 120.

Selon un deuxième mode de réalisation, le paquet PT est modifié en incluant l'adresse secondaire @PRIV2 dans un champ particulier de son en-tête. Cette transformation du paquet de données permet un mode de routage dit routage à la source. Il n'est pas toujours supporté par les nœuds d'un réseau de télécommunications.

Selon un troisième mode de réalisation, le paquet PT est transformé à l'identique, le routage se faisant à partir de l'identifiant de route dédié IDR2 qui ne nécessite aucune modification du paquet.

Dans le mode de réalisation décrit en relation avec la **figure 8**, l'équipement terminal 100 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 110, une

mémoire vive de type RAM 120, une mémoire morte de type ROM 130 et des moyens 140 de télécommunications avec le réseau 1.

Conformément à l'invention, l'équipement terminal 100 comporte une mémoire 150 comprenant une base de données dans laquelle il sauvegarde ses données de configuration, notamment l'association entre l'adresse publique @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi bien être externe à l'équipement terminal pourvu qu'il puisse y accéder pour récupérer les données de configuration dont il a besoin pour la mise en œuvre de sa connectivité IP sur le réseau de télécommunications RT.

Selon un mode de réalisation de l'invention, décrit en relation avec la **figure 10**, on considère maintenant un équipement terminal 110 connecté au réseau domestique d'une passerelle domestique 210 placée en coupure de flux de données entre l'équipement terminal 110 et le réseau de télécommunications RT. Dans ce mode de réalisation, la passerelle domestique 210 constitue un équipement terminal selon l'invention. De façon connue, elle comprend une table de traduction d'adresses ou table de Nattage NAT qui fait correspondre, pour un flux émis par un équipement terminal 110 de son réseau domestique, une adresse @PRIV1et un port P1 de ce terminal dans le réseau domestique à au moins une adresse publique @PUB2 et un port P2 de la passerelle domestique 210 dans le réseau de télécommunications de l'opérateur RT, P2 appartenant à la plage de numéros définies par le masque de ports MP. Cette table NAT est, par exemple, stockée dans une base de données BDP qui peut être interne ou externe.

Une passerelle domestique selon l'invention met donc en œuvre des moyens de traduction d'adresses sur réception d'un paquet de données PT émis par un équipement terminal de son réseau domestique et adressé au réseau de télécommunications et sur réception d'un paquet de données PT' destiné à cet équipement terminal.

Pour les communications sortantes, la seule différence par rapport aux pratiques existantes est que l'équipement terminal 110 ou la passerelle domestique 120 selon l'invention est obligé de choisir un port source dans la plage fixée par le

masque de port affecté par le fournisseur de service. Tous les messages, sauf les messages BIND(), sont émis avec comme adresse source l'adresse principale ou adresse publique @PUB affectée par le fournisseur de service. Pour les messages BIND(), l'adresse source utilisée est l'adresse secondaire IDR2= @PRIV2.

De façon avantageuse, les paquets de données émis par un équipement terminal donné traversent le dispositif de routage AN 300 auquel cet équipement terminal est attaché. Le dispositif de routage AN procède au marquage des paquets de données IP émis par cet équipement terminal. Le champ DS (Differentiated Services) ou ToS (Type of Service) des paquets IP peut être utilisé pour le marquage, si et seulement si le masque du port ne dépasse pas 6 bits. En effet, lors de la réception du message BIND(), le dispositif de routage AN préinstalle une règle de marquage pour les messages émis par l'équipement terminal en question. Le processus d'encapsulation est alors guidé par la valeur du champ DS des paquets IP reçus et donc le dispositif de routage AN n'a plus besoin d'inspecter les informations relatives à la couche transport. Ainsi le temps de traitement des messages sera amélioré. Cette variante suppose que la machine terminale ne modifie pas le code DS/TOS utilisé et qu'il est repositionné à la même valeur pour les paquets réponses.

Le dispositif de routage conforme à l'invention peut être hébergé par des routeurs traditionnels ou par des équipements dédiés. Etant données que les modifications requises par l'invention lors de la phase de découverte d'un serveur de configuration, par exemple selon le protocole DHCP ne sont pas majeures, les architectures actuelles peuvent être adaptées.

Le dispositif de routage AN selon l'invention peut être hébergé n'importe où dans le réseau de télécommunications de l'opérateur. De façon avantageuse, il est déployé au sein d'un POP d'accès au réseau. De plus, un ou plusieurs dispositifs de routage AN peuvent être déployés au sein du même POP d'accès IP, aussi bien de façon centralisée que distribuée.

## REVENDICATIONS

**1.** Procédé de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit procédé comprend, sur réception dudit paquet, les étapes suivantes :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse de destination à partir du masque de ports; et
- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**2.** Procédé de routage d'un paquet de données IP selon la revendication **1**, caractérisé en ce que ledit au moins un identifiant est une adresse secondaire de destination de l'équipement destinataire.

**3.** Procédé de routage d'un paquet de données IP selon la revendication **2**, caractérisé en ce que le procédé comprend, préalablement à l'étape de routage, une étape de transformation du paquet pour y ajouter ladite adresse secondaire et en ce que le paquet est routé à partir de ladite adresse secondaire.

**4.** Procédé de routage selon la revendication **1**, caractérisé en ce que l'identifiant est un identifiant de route spécifique à cet équipement et en ce que le routage du paquet est effectué à partir dudit identifiant de route spécifique.

**5.** Dispositif de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit dispositif est apte à mettre en œuvre, sur réception dudit paquet, les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et

- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**6.** Equipement dans un réseau de télécommunications, apte à recevoir un paquet de données IP comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce qu'il comprend au moins un dispositif de routage comprenant les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et
- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**7.** Procédé de configuration d'un équipement terminal connecté à un réseau de télécommunications, caractérisée en ce qu'il comprend, sur réception d'une requête de configuration émise par ledit équipement, les étapes suivantes :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et
- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

**8.** Procédé de configuration d'un équipement terminal selon la revendication **7**, caractérisé en ce qu'il comprend une étape d'affectation audit équipement terminal d'un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal et en ce que le message de configuration comprend en outre ledit identifiant de dispositif de routage.

**9.** Procédé de configuration selon la revendication **7**, caractérisé en ce que ledit message de configuration est envoyé en outre à dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal.

**10**. Serveur de configuration dans un réseau de télécommunications, caractérisé en ce que, sur réception d'une requête de configuration émise par un équipement terminal, il est apte à mettre en œuvre les moyens suivants :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et
- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse publique, ledit masque de port et ledit identifiant de routage.

**11**. Procédé de mise en œuvre d'une configuration par un équipement terminal connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire, un masque de port définissant une plage de numéros qui lui est dédiée et un identifiant de routage, ledit procédé comprend les étapes suivantes :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

**12.** Procédé de mise en œuvre d'une configuration selon la revendication **11**, caractérisé en ce que, un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal ayant été reçu, ledit procédé comprend en outre une étape d'envoi des données de configuration audit dispositif de routage.

**13.** Procédé de mise en œuvre d'une configuration selon la revendication **11**, caractérisé en ce que, sur réception d'un paquet de données comprenant une adresse de destination, un numéro de port et un identifiant de routage, ledit procédé comprend en outre une étape de vérification d'une appartenance du numéro de port à la plage de

numéros définie par son masque de port et une étape de rejet dudit paquet si la vérification est négative.

**14**. Equipement terminal client connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire partagée avec une pluralité d'équipements terminaux, un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage, il est apte à mettre en œuvre les moyens suivants :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

**15.** Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de routage selon la revendication **1**.

**16.** Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de configuration selon la revendication **7**.

**17**. Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de mise en œuvre d'une configuration selon la revendication **11**.

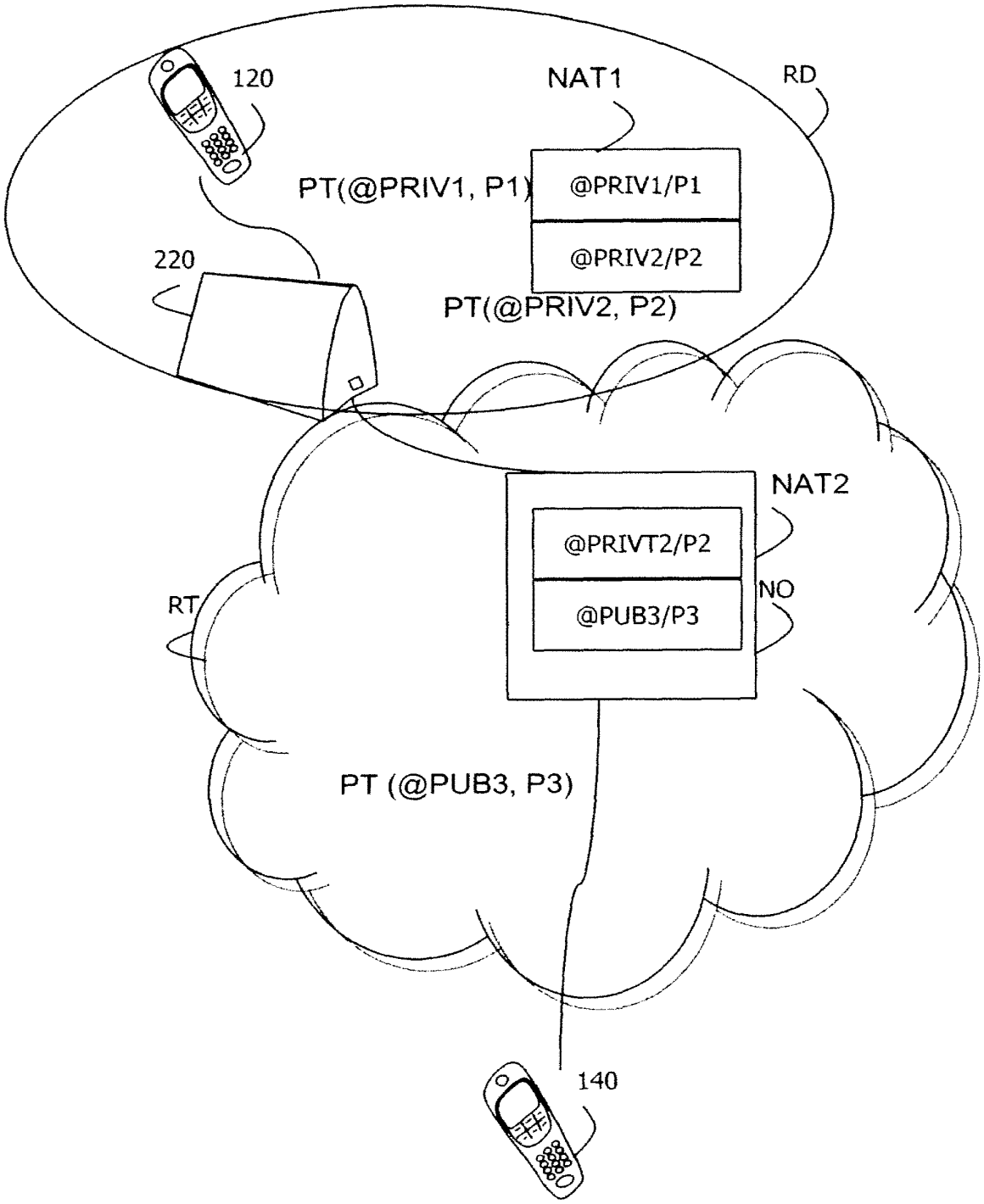

120
NAT1
RD
PT(@PRIV1, P1)
@PRIV1/P1
@PRIV2/P2
220
PT(@PRIV2, P2)
NAT2
@PRIVT2/P2
NO
@PUB3/P3
RT
PT (@PUB3, P3)
140

FIG. 1

MC

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | x | x | x | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x |
| x | x | x | x | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| x | x | x | x | x | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

FIG. 2A

MC

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | x | x | x | x | x | 1 | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | x | x | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | x | x | 1 | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | 1 | x | x |
| 1 | 1 | 1 | 1 | x | x | x | 1 | x | 1 | x | 1 | 1 | 1 | 1 | x |
| x | x | x | x | 1 | x | 1 | x | 1 | x | 1 | x | 1 | x | 1 | 1 |
| x | x | x | x | x | 1 | 1 | x | 1 | x | 1 | 1 | 1 | x | x | x |

FIG. 2B

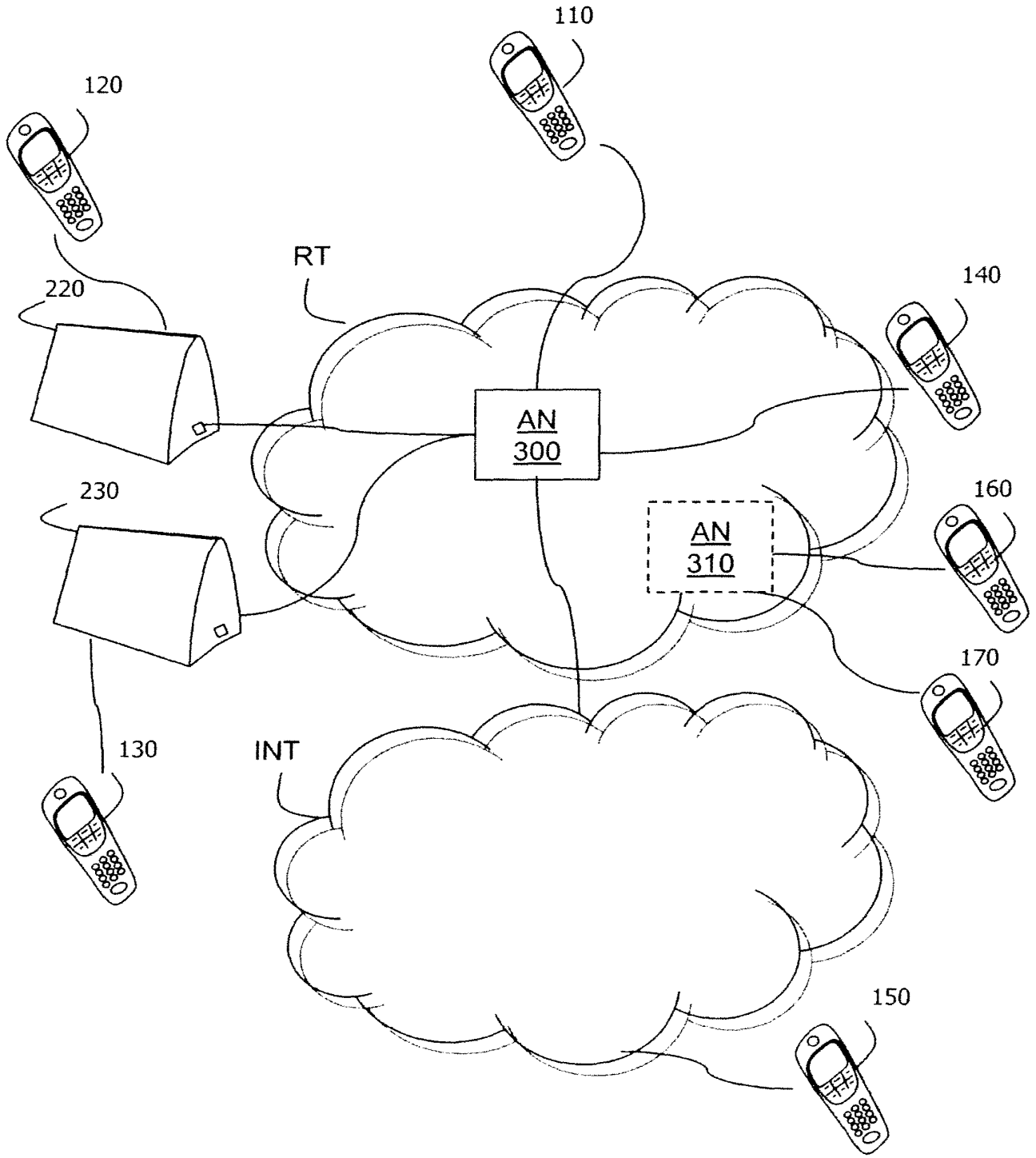



FIG. 3

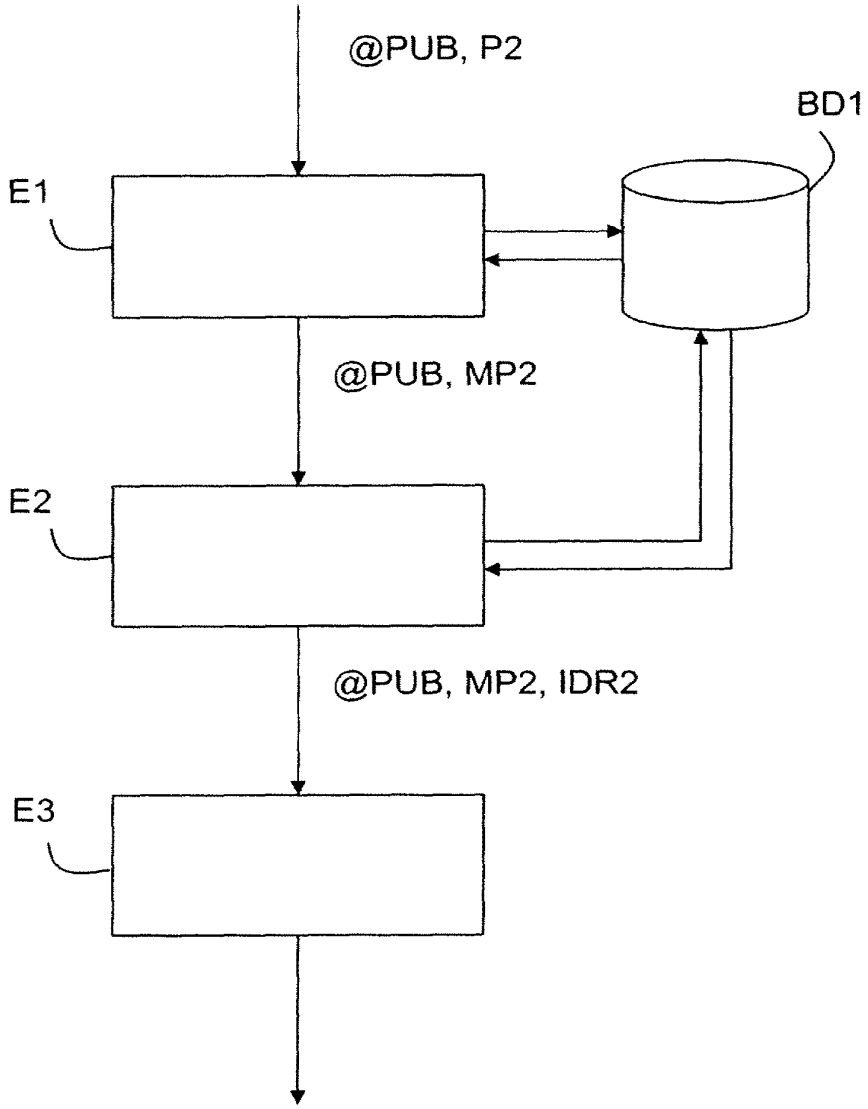



FIG. 4

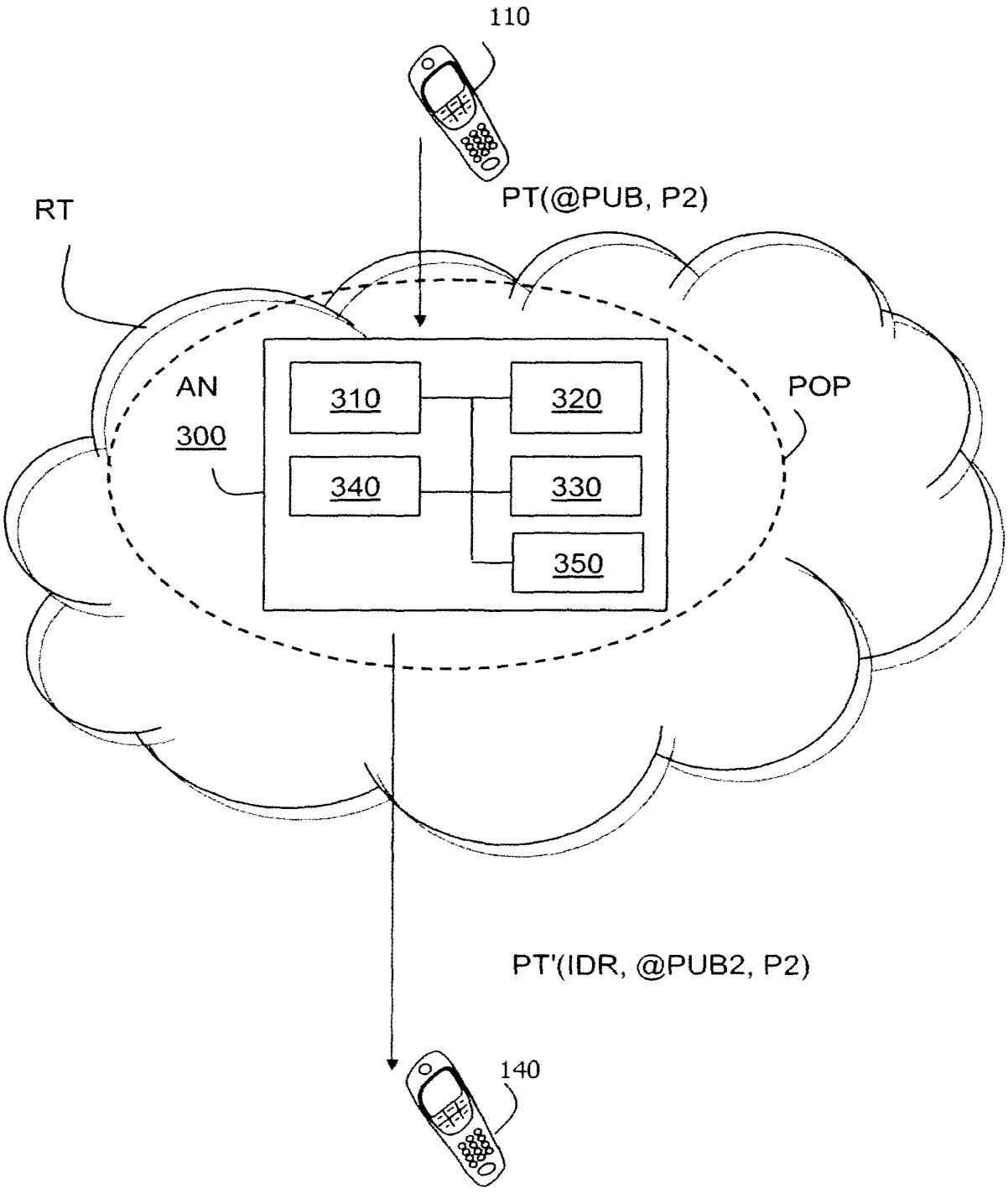



FIG. 5

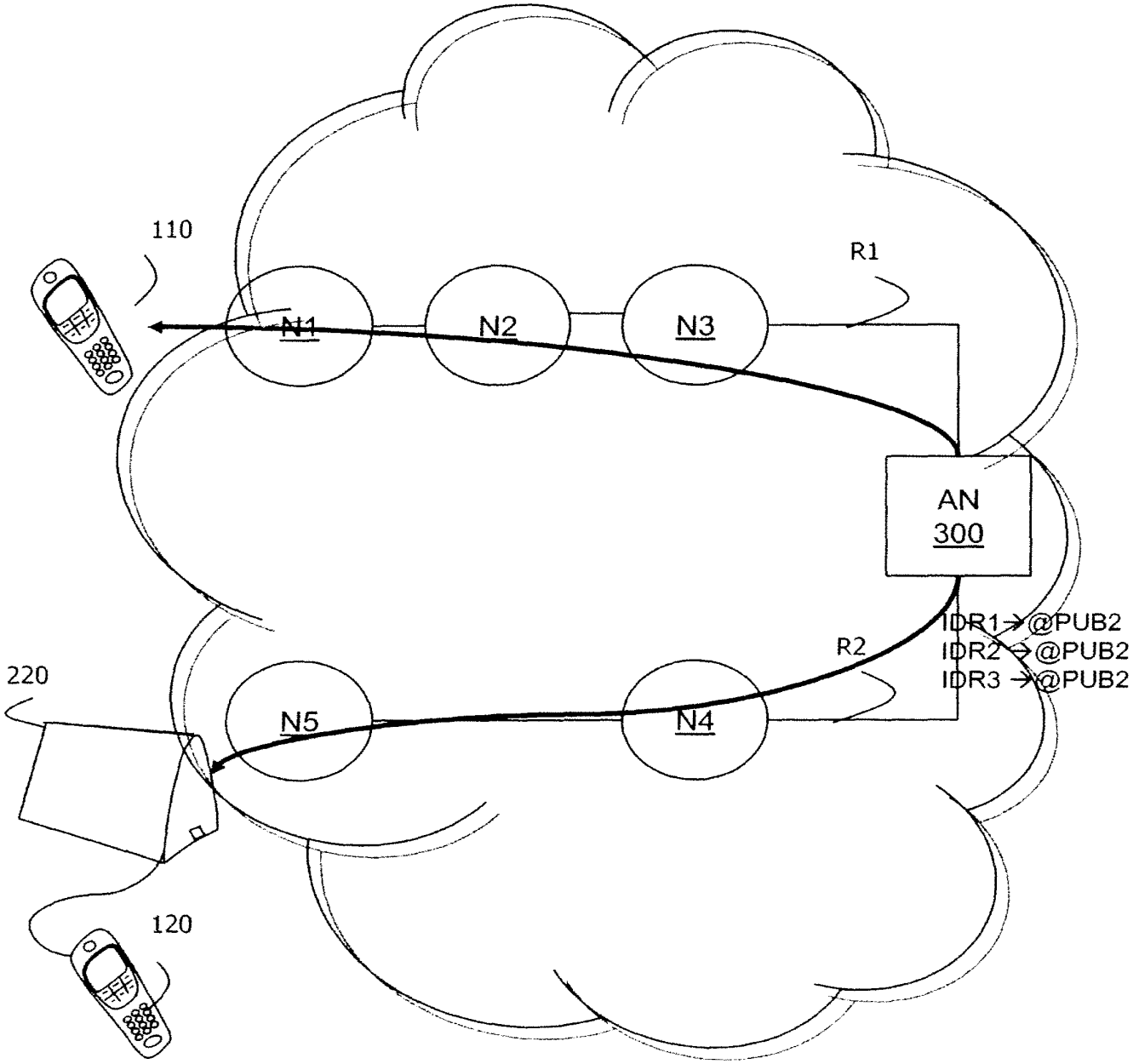

110
R1
N1
N2
N3
AN
300
IDR1→@PUB2
IDR2→@PUB2
IDR3→@PUB2
R2
220
N5
N4
120

FIG. 6

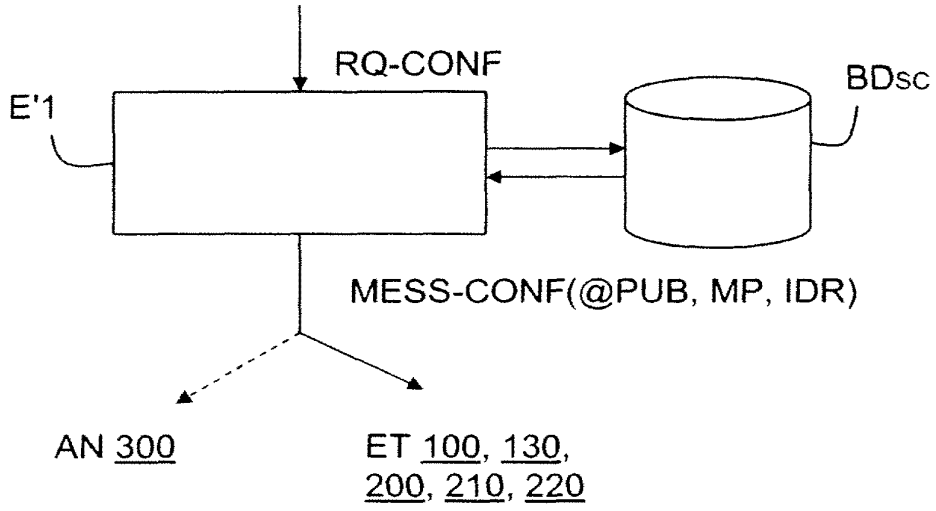

RQ-CONF
E'1
BDsc
MESS-CONF(@PUB, MP, IDR)
AN 300
ET 100, 130,
200, 210, 220

FIG. 7

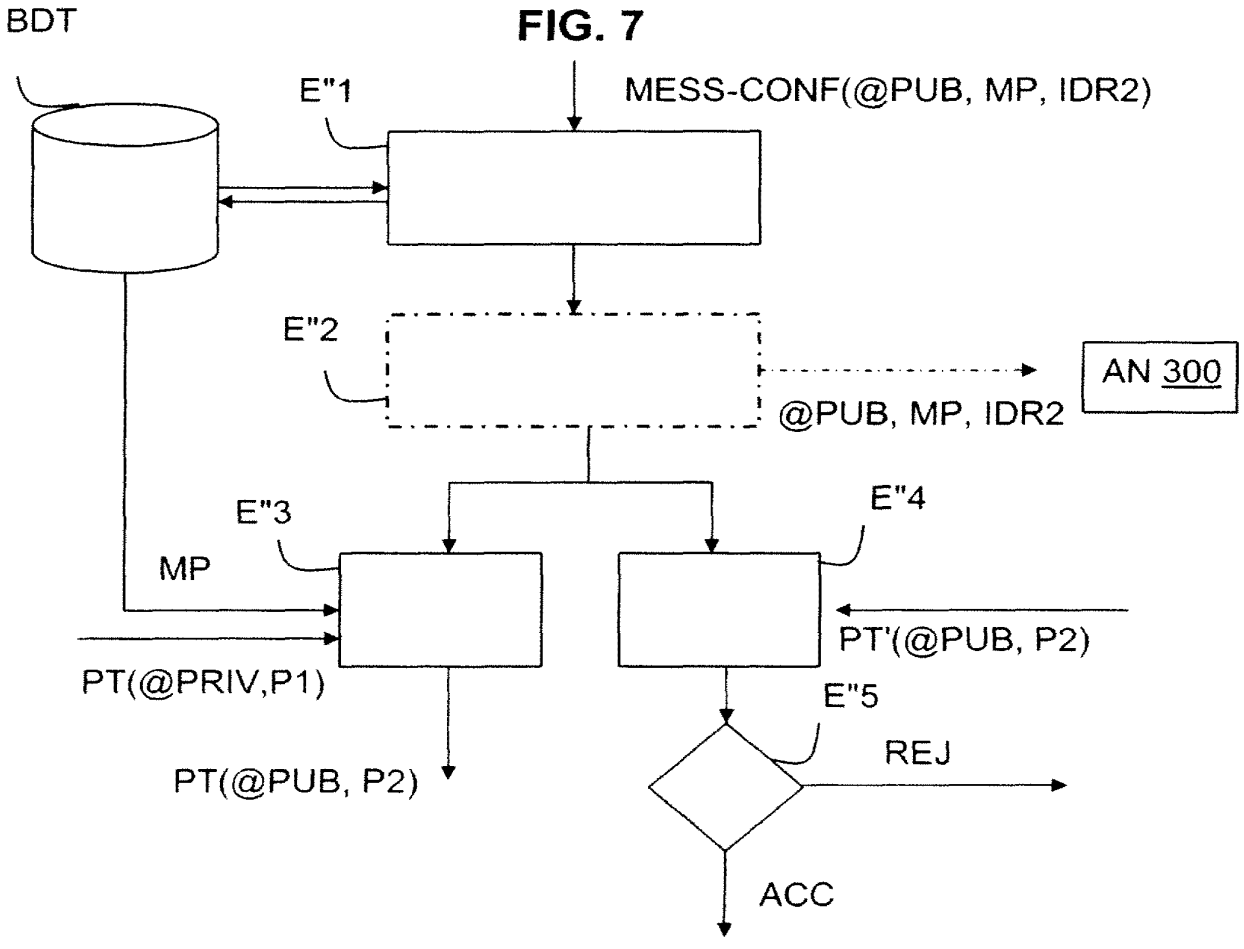

BDT
E"1
MESS-CONF(@PUB, MP, IDR2)
E"2
AN 300
@PUB, MP, IDR2
E"3
E"4
MP
PT'(@PUB, P2)
PT(@PRIV,P1)
E"5
REJ
PT(@PUB, P2)
ACC

FIG. 9

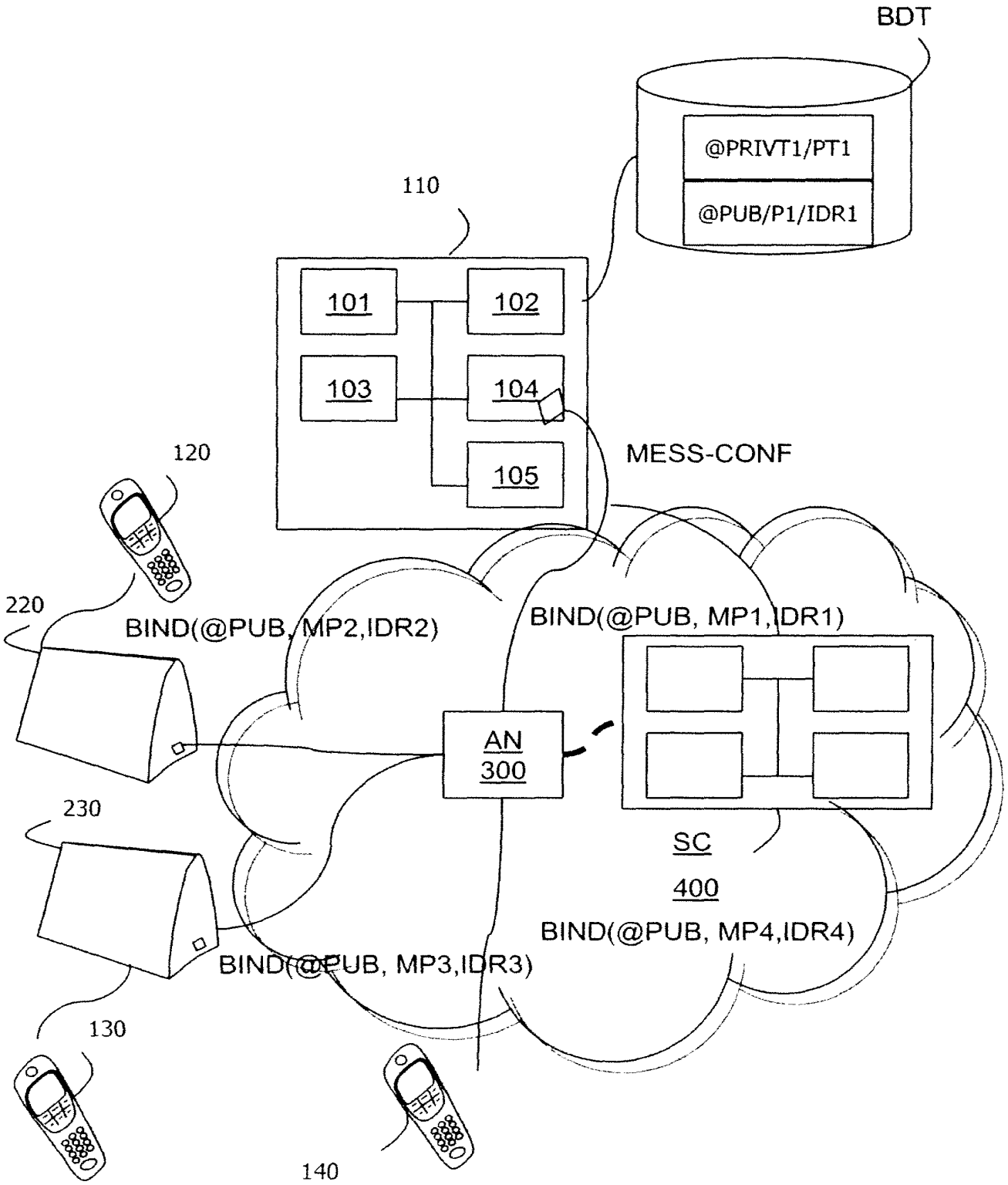

BDT
@PRIVT1/PT1
@PUB/P1/IDR1
110
101
102
103
104
105
MESS-CONF
120
220
BIND(@PUB, MP2,IDR2)
BIND(@PUB, MP1,IDR1)
AN
300
230
SC
400
BIND(@PUB, MP4,IDR4)
BIND(@PUB, MP3,IDR3)
130
140

FIG. 8

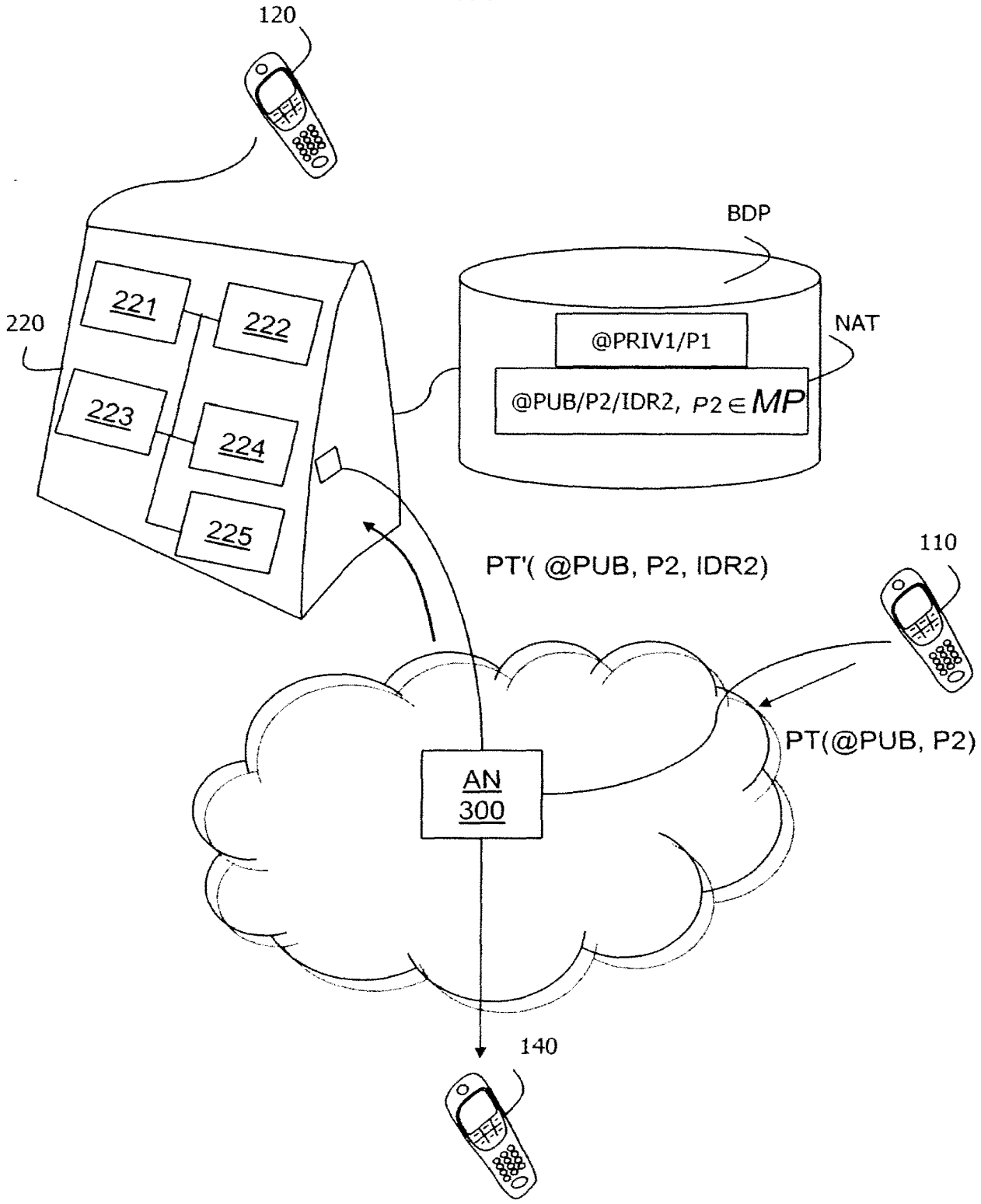

120
BDP
220
221
222
223
224
225
NAT
@PRIV1/P1
@PUB/P2/IDR2, P2 ∈ MP
PT'( @PUB, P2, IDR2)
110
PT(@PUB, P2)
AN
300
140

FIG. 10

(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATION EN MATIÈRE DE BREVETS (PCT)

(19) Organisation Mondiale de la Propriété Intellectuelle
Bureau international

(43) Date de la publication internationale
15 octobre 2009 (15.10.2009)

PCT

(10) Numéro de publication internationale
WO 2009/125158 A3

(51) Classification internationale des brevets :
*H04L 29/12* (2006.01) *H04L 12/28* (2006.01)

(21) Numéro de la demande internationale :
PCT/FR2009/050548

(22) Date de dépôt international :
31 mars 2009 (31.03.2009)

(25) Langue de dépôt : français

(26) Langue de publication : français

(30) Données relatives à la priorité :
0852108 31 mars 2008 (31.03.2008) FR

(71) Déposant *(pour tous les États désignés sauf US)* : **FRANCE TELECOM** [FR/FR]; 6, place d'Alleray, F-75015 Paris (FR).

(72) Inventeur; et

(75) Inventeur/Déposant *(pour US seulement)* : **BOUCADAIR, Mohamed** [FR/FR]; 124, rue Saint Jean, F-14000 Caen (FR).

(74) Mandataire : **FRANCE TELECOM R&D/PIV/BREVETS**; BENETIERE Marion, 38-40, rue du Général Leclerc, F-92794 Issy Les Moulineaux Cedex 9 (FR).

(81) États désignés *(sauf indication contraire, pour tout titre de protection nationale disponible)* : AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) États désignés *(sauf indication contraire, pour tout titre de protection régionale disponible)* : ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasien (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), européen (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,

*[Suite sur la page suivante]*

(54) Title : METHOD OF ROUTING A DATA PACKET IN A NETWORK AND ASSOCIATED DEVICE

(54) Titre : PROCEDE DE ROUTAGE D'UN PAQUET DE DONNEES DANS UN RESEAU ET DISPOSITIF ASSOCIE

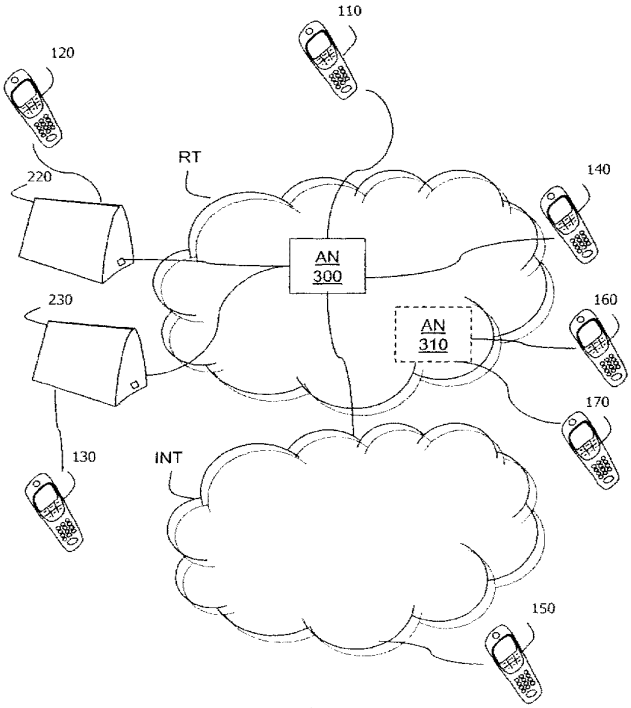



FIG. 3

(57) Abstract : The invention relates to a method of routing a data packet in a telecommunications network, said packet comprising a primary destination address and a destination port number. On receipt of said packet, the following steps are implemented: determination of a mask of ports defining a port number range to which the destination port number belongs; selection of an identifier of a destination apparatus for the packet from among a plurality of identifiers of apparatuses associated with said destination address on the basis of the ports mask; and routing of the packet to the destination apparatus on the basis of said identifier.

(57) Abrégé : L'invention concerne un procédé de routage d'un paquet de données dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination. Sur réception dudit paquet, les étapes suivantes sont mises en oeuvre : détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination; sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse de destination à partir du masque de ports; et routage du paquet vers l'équipement destinataire à partir dudit identifiant.

WO 2009/125158 A3

MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Déclarations en vertu de la règle 4.17** :

— *relative à la qualité d'inventeur (règle 4.17.iv))*

**Publiée** :

— *avec rapport de recherche internationale (Art. 21(3))*

— *avant l'expiration du délai prévu pour la modification des revendications, sera republiée si des modifications sont reçues (règle 48.2.h))*

**(88) Date de publication du rapport de recherche internationale** :

15 juillet 2010

# INTERNATIONAL SEARCH REPORT

International application No
PCT/FR2009/050548

**A. CLASSIFICATION OF SUBJECT MATTER**
INV. H04L29/12 H04L12/28
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 2002/141389 A1 (FANGMAN RICHARD E [US] ET AL) 3 October 2002 (2002-10-03) paragraph [0019] - paragraph [0022] paragraph [0063] paragraph [0274] | 1-17 |
| A | US 7 320 027 B1 (CHANG LI FUNG [US] ET AL) 15 January 2008 (2008-01-15) column 8, line 21 - column 9, line 5 column 6, line 51 - column 7, line 2 | 1-17 |
| A | US 2002/116523 A1 (WARRIER ULHAS S [US] ET AL) 22 August 2002 (2002-08-22) paragraph [0029] paragraph [0033] - paragraph [0043] | 7-14,16, 17 |

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 20 May 2010 | 28/05/2010 |

| Name and mailing address of the ISA/ | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL – 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Lebas, Yves |

Form PCT/ISA/210 (second sheet) (April 2005)

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/FR2009/050548

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

## See supplemental sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

International application No.
PCT/FR2009/050548

**The International Searching Authority has found that the international application contains multiple (groups of) inventions, as follows:**

**1. Claims 1 to 6 & 15**

**A method, a device and equipment for routing IP data packets. A computer program for implementing the routing method.**

**– – – –**

**2. Claims 7 to 14, 16 & 17**

**A method and a server for configuring an item of terminal equipment. A method and terminal equipment for implementing the received configuration. Computer programs for implementing the configuration method, and the configuration implementation method itself.**

**– – – –**

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/FR2009/050548

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| US 2002141389 A1 | 03-10-2002 | NONE | |
| US 7320027 B1 | 15-01-2008 | NONE | |
| US 2002116523 A1 | 22-08-2002 | NONE | |

# RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale n°
PCT/FR2009/050548

**A. CLASSEMENT DE L'OBJET DE LA DEMANDE**
INV. H04L29/12 H04L12/28
ADD.

Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB

**B. DOMAINES SUR LESQUELS LA RECHERCHE A PORTE**

Documentation minimale consultée (système de classification suivi des symboles de classement)
H04L

Documentation consultée autre que la documentation minimale dans la mesure où ces documents relèvent des domaines sur lesquels a porté la recherche

Base de données électronique consultée au cours de la recherche internationale (nom de la base de données, et si cela est réalisable, termes de recherche utilisés)
EPO-Internal, WPI Data

**C. DOCUMENTS CONSIDERES COMME PERTINENTS**

| Catégorie* | Identification des documents cités, avec, le cas échéant, l'indication des passages pertinents | no. des revendications visées |
|---|---|---|
| X | US 2002/141389 A1 (FANGMAN RICHARD E [US] ET AL) 3 octobre 2002 (2002-10-03)<br>alinéa [0019] - alinéa [0022]<br>alinéa [0063]<br>alinéa [0274] | 1-17 |
| A | US 7 320 027 B1 (CHANG LI FUNG [US] ET AL) 15 janvier 2008 (2008-01-15)<br>colonne 8, ligne 21 - colonne 9, ligne 5<br>colonne 6, ligne 51 - colonne 7, ligne 2 | 1-17 |
| A | US 2002/116523 A1 (WARRIER ULHAS S [US] ET AL) 22 août 2002 (2002-08-22)<br>alinéa [0029]<br>alinéa [0033] - alinéa [0043] | 7-14,16, 17 |

☐ Voir la suite du cadre C pour la fin de la liste des documents

☒ Les documents de familles de brevets sont indiqués en annexe

* Catégories spéciales de documents cités:

"A" document définissant l'état général de la technique, non considéré comme particulièrement pertinent

"E" document antérieur, mais publié à la date de dépôt international ou après cette date

"L" document pouvant jeter un doute sur une revendication de priorité ou cité pour déterminer la date de publication d'une autre citation ou pour une raison spéciale (telle qu'indiquée)

"O" document se référant à une divulgation orale, à un usage, à une exposition ou tous autres moyens

"P" document publié avant la date de dépôt international, mais postérieurement à la date de priorité revendiquée

"T" document ultérieur publié après la date de dépôt international ou la date de priorité et n'appartenenant pas à l'état de la technique pertinent, mais cité pour comprendre le principe ou la théorie constituant la base de l'invention

"X" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme nouvelle ou comme impliquant une activité inventive par rapport au document considéré isolément

"Y" document particulièrement pertinent; l'invention revendiquée ne peut être considérée comme impliquant une activité inventive lorsque le document est associé à un ou plusieurs autres documents de même nature, cette combinaison étant évidente pour une personne du métier

"&" document qui fait partie de la même famille de brevets

| Date à laquelle la recherche internationale a été effectivement achevée | Date d'expédition du présent rapport de recherche internationale |
|---|---|
| 20 mai 2010 | 28/05/2010 |

| Nom et adresse postale de l'administration chargée de la recherche internationale | Fonctionnaire autorisé |
|---|---|
| Office Européen des Brevets, P.B. 5818 Patentlaan 2<br>NL – 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040,<br>Fax: (+31-70) 340-3016 | Lebas, Yves |

Demande internationale n°
PCT/FR2009/050548

## RAPPORT DE RECHERCHE INTERNATIONALE

**Cadre n°. II Observations – lorsqu'il a été estimé que certaines revendications ne pouvaient pas faire l'objet d'une recherche (suite du point 2 de la première feuille)**

Le rapport de recherche internationale n'a pas été établi en ce qui concerne certaines revendications conformément à l'article 17.2)a) pour les raisons suivantes :

1. ☐ Les revendications n$^{os}$ se rapportent à un objet à l'égard duquel l'administration chargée de la recherche internationale n'est pas tenue de procéder à la recherche, à savoir :

2. ☐ Les revendications n$^{os}$ parce qu'elles se rapportent à des parties de la demande internationale qui ne remplissent pas suffisamment les conditions prescrites pour qu'une recherche significative puisse être effectueé, en particulier :

3. ☐ Les revendications n$^{os}$ parce qu'elles sont des revendications dépendantes et ne sont pasrédigées conformément aux dispositions de la deuxième et de la troisième phrases de la règle 6.4.a).

**Cadre n°. III Observations – lorsqu'il y a absence d'unité de l'invention (suite du point 3 de la première feuille)**

L'administration chargée de la recherche internationale a trouvé plusieurs inventions dans la demande internationale, à savoir:

voir feuille supplémentaire

1. ☒ Comme toutes les taxes additionnelles exigées ont été payées dans les délais par le déposant, le présent rapport de recherche internationale porte sur toutes les revendications pouvant faire l'objet d'une recherche.

2. ☐ Comme toutes les revendications qui se prêtent à la recherche ont pu faire l'objet de cette recherche sans effort particulier justifiant des taxes additionnelles, l'administration chargée de la recherche internationale n'a sollicité le paiement d'aucunes taxes de cette nature.

3. ☐ Comme une partie seulement des taxes additionnelles demandées a été payée dans les délais par le déposant, le présent rapport de recherche internationale ne porte que sur les revendications pour lesquelles les taxes ont été payées, à savoir les revendications n$^{os}$:

4. ☐ Aucunes taxes additionnelles demandées n'ont été payées dans les délais par le déposant. En conséquence, le présent rapport de recherche internationale ne porte que sur l'invention mentionnée en premier lieu dans les revendications; elle est couverte par les revendications n$^{os}$:

**Remarque quant à la réserve**

☐ Les taxes additionnelles étaient accompagnées d'une réserve de la part du déposant et, le cas échéant, du paiement de la taxe de réserve.

☐ Les taxes additionnelles étaient accompagnées d'une réserve de la part du déposant mais la taxe de réserve n'a pas été payée dans le délai prescrit dans l'invitation.

☒ Le paiement des taxes additionnelles n'était assorti d'aucune réserve.

**SUITE DES RENSEIGNEMENTS INDIQUES SUR PCT/ISA/ 210**

L'administration chargée de la recherche internationale a trouvé plusieurs (groupes d') inventions dans la demande internationale, à savoir:

1. revendications: 1-6, 15

   procédé, dispositif, et équipement de routage de paquets de données IP. Programme d'ordinateur pour mettre en oeuvre le procédé de routage.

   ---

2. revendications: 7-14, 16, 17

   procédé et serveur de configuration d'un équipement terminal. Procédé et équipement terminal pour mettre en oeuvre la configuration reçue. Programmes d'ordinateur pour mettre en oeuvre le procédé de configuration et le procédé de mise en oeuvre de configuration.

   ---

# RAPPORT DE RECHERCHE INTERNATIONALE

**Renseignements relatifs aux membres de familles de brevets**

**Demande internationale n°**
PCT/FR2009/050548

| Document brevet cité au rapport de recherche | Date de publication | Membre(s) de la famille de brevet(s) | Date de publication |
|---|---|---|---|
| US 2002141389 A1 | 03-10-2002 | AUCUN | |
| US 7320027 B1 | 15-01-2008 | AUCUN | |
| US 2002116523 A1 | 22-08-2002 | AUCUN | |

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RÉPUBLIQUE FRANÇAISE

PCT/FR2009/050548

INSTITUT NATIONAL
DE LA PROPRIÉTÉ
INDUSTRIELLE

# d'invention

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Pour le Directeur général de l'Institut
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Le Chef du Département des brevets

Martine PLANCHE

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# BREVET D'INVENTION

## CERTIFICAT D'UTILITE

certa N° 12236 01

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REQUÊTE EN DÉLIVRANCE

| | |
|---|---|
| DATE DE REMISE DES PIÈCES: **31/03/2008**<br>N° D'ENREGISTREMENT NATIONAL: **0852108**<br>DÉPARTEMENT DE DÉPÔT:<br>DATE DE DÉPÔT: | FRANCE TELECOM<br>Marion BENETIERE<br>DIVISION R&D/PIV/BREVETS<br>38-40 rue du Général Leclerc<br>92794 ISSY LES MOULINEAUX CEDEX 9<br>France |
| Vos références pour ce dossier: 06949 | |

| | | | |
|---|---|---|---|
| **1 NATURE DE LA DEMANDE** | | | |
| Demande de brevet | | | |
| **2 TITRE DE L'INVENTION** | | | |
| | PROCEDE DE ROUTAGE D'UN PAQUET DE DONNEES DANS UN RESEAU ET DISPOSITIF ASSOCIE | | |
| **3 DECLARATION DE PRIORITE OU REQUETE DU BENEFICE DE LA DATE DE DEPOT D'UNE DEMANDE ANTERIEURE FRANCAISE** | Pays ou organisation | Date | N° |
| **4-1 DEMANDEUR** | | | |
| Nom | FRANCE TELECOM | | |
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| Code postal et ville | 92794 ISSY LES MOULINEAUX CEDEX 9 | | |
| Pays | France | | |

| 6 DOCUMENTS ET FICHIERS JOINTS | Fichier électronique | Pages | Details |
|---|---|---|---|
| Texte du brevet | textebrevet.pdf | 29 | D 24, R 4, AB 1 |
| Dessins | dessins.pdf | 9 | page 9, figures 11, Abrégé: page 3, Fig.3 |
| Désignation d'inventeurs | Design.PDF | | |
| POUVOIR GENERAL | other1.pdf | | |

| 7 MODE DE PAIEMENT | |
|---|---|
| Mode de paiement | Prélèvement du compte courant |
| Numéro du compte client | 432 |

| 8 RAPPORT DE RECHERCHE | |
|---|---|
| Etablissement immédiat | |

| 9 REDEVANCES JOINTES | Devise | Taux | Quantité | Montant à payer |
|---|---|---|---|---|
| 062 Dépôt d'une demande électronique | EURO | 25.00 | 1.00 | 25.00 |
| 063 Rapport de recherche | EURO | 500.00 | 1.00 | 500.00 |
| 068 Revendication à partir de la 11ème | EURO | 40.00 | 7.00 | 280.00 |
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Signataire: FR, FRANCE TELECOM RD, Myriam PLAT
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(Demandeur)

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# BREVET D'INVENTION
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| Numéro de demande | 0852108 | |
| Numéro de soumission | 1000027510 | |
| Date de réception | 31 mars 2008 | |
| Vos références | 06949 | |
| Demandeur | FRANCE TELECOM | |
| Pays | FR | |
| Titre de l'invention | PROCEDE DE ROUTAGE D'UN PAQUET DE DONNEES DANS UN RESEAU ET DISPOSITIF ASSOCIE | |
| Documents envoyés | package-data.xml | FR-office-specific-info.xml |
| | request.xml | fee-sheet.xml |
| | application-body.xml | indication-bio-deposit.xml |
| | textebrevet.pdf (29 p.) | dessins.pdf (9 p.) |
| | Design.PDF (1 p.) | ValidLog.PDF (1 p.) |
| | other1.pdf (1 p.) | Requetefr.PDF (2 p.) |
| Déposé par | CN=Myriam PLAT,O=FRANCE TELECOM RD,C=FR | |
| Méthode de dépôt | Dépôt électronique | |
| Date et heure de réception électronique | 31 mars 2008, 17:01:41 (CEST) | |
| Empreinte officielle du dépôt | 01:A5:E5:B9:3A:18:68:70:2F:5F:CC:20:6E:1B:20:F0:14:EC:AC:7B | |

/INPI, section dépôt/

**Domaine de l'invention**

Le domaine de l'invention est celui d'un réseau de télécommunications, en particulier un réseau de télécommunications IP dans lequel sont transportés des paquets de données d'un équipement source vers un équipement de destination identifié par une adresse de destination.

Un tel réseau de télécommunications groupe une pluralité d'équipements, de liens et de fonctions dédiés au transport des données issues d'équipements terminaux connectés à ce réseau. En particulier, les fonctions de transport peuvent être implémentées grâce à l'activation de protocoles de routage et de transmission. Un réseau de télécommunications administré par un opérateur est encore appelé un domaine.

Un fournisseur de service de connectivité IP déploie une architecture dédiée pour permettre aux utilisateurs d'équipements terminaux d'être joignables. L'accès au service de connectivité IP est géré par le fournisseur de service qui s'appuie sur le réseau de télécommunications d'un opérateur pour router les paquets de données émis par les équipements terminaux vers leur destination finale. Dans certains cas, ledit fournisseur de service est aussi l'opérateur de réseau de télécommunications.

L'invention concerne un mécanisme d'allocation d'adresses et de numéros de ports permettant d'affecter une même adresse primaire à une pluralité d'équipements terminaux du réseau ce télécommunications.

Ainsi, l'invention s'applique à tout type d'adressage, public ou privé, mais de façon privilégiée mais non limitative aux adresses IP publiques définies par le protocole IPv4 (Internet Protocol version 4).

Une passerelle domestique placée en coupure de flux de paquets de données entre un terminal d'un réseau domestique privé et le réseau de télécommunications public d'un opérateur, qu'on appelle aussi domaine, comporte, de façon connue, une table dans laquelle elle associe l'adresse IP privée et le port associé à ce terminal, avec une adresse IP publique de type IPv4 et un port de cette même passerelle sur le réseau public.

Cette table est connue de l'homme du métier sous l'appellation "table de nattage", cette expression venant de l'acronyme NAT (*Network Address Translation* en anglais).

Il est communément admis par la communauté des fournisseurs de service IP que l'épuisement des adresses IPv4 publiques est une fatalité. Pour éviter ce problème, la communauté s'est mobilisée dans le passé, ce qui a conduit à la définition d'un nouveau protocole IPv6 (*Internet Protocol version 6*), qui offre un grand nombre d'adresses IP et un mécanisme de routage hiérarchique aux performances améliorées. Néanmoins, cette solution n'est en pratique pas activée par les opérateurs, pour des raisons financières ou stratégiques. Ces mêmes fournisseurs ne sont toutefois pas indifférents aux alarmes récemment émis par l'IETF (*Internet Engineering Task Force*), notamment dans des rapports présentés au sein du groupe de travail GROW (*Global Routing Operations Working Group)* concernant un risque d'épuisement des adresses IPv4 de l'IANA fin 2009.

Pour limiter le nombre d'adresses publiques IPv4 nécessaire pour la fourniture d'un service de connectivité IP, une solution de double NAT, appelée aussi NAT opérateur, a été proposée et implémentée. Elle consiste à activer une fonction NAT au sein du réseau de télécommunications de l'opérateur, de telle sorte que les passerelles domestiques utilisent un adressage privé dans leur table de Nattage. En relation avec la **figure 1**, on considère un équipement terminal 120 dans un réseau domestique RD connecté à une passerelle domestique 220 placée en coupure de flux entre l'équipement terminal et un réseau de télécommunications RT. La passerelle met en œuvre une première fonction de NAT NAT1 qui traduit un premier couple d'adressage privé d'un paquet de données PT émis par l'équipement terminal 120 en un deuxième couple d'adressage privé (@PRIV2, P2). Elle émet ensuite le paquet PT transformé dans le réseau RT. Ce paquet est reçu par un équipement NO du réseau. Cet équipement NO met en œuvre une fonction de NAT opérateur NAT2 qui traduit le deuxième couple d'adressage privé (@PRIV2, P2) du paquet de données PT en un troisième couple d'adressage publique (@PUB3, P3). Ainsi, c'est la fonction de NAT de l'opérateur qui assure la traduction des adresses privées des passerelles domestiques

vers des adresses publiques, ce qui permet d'économiser un nombre non négligeable d'adresses publiques IPv4.

**Inconvénients de la technique antérieure**

La solution de NAT Opérateur présente des inconvénients, parmi lesquels :

- une complexification de l'acheminement des paquets de données IP : du fait de l'introduction d'un deuxième niveau de traduction d'adresses, les paquets de données doivent être modifiés deux fois;
- la nécessité d'adapter la mise en œuvre de protocoles de signalisation applicative ou ALG (*Application Level Gateway*) conventionnels tels que DNS (*Domain Name System*), FTP (*File Transfer Protocol*) ou encore SIP (*Session Initiation Protocol*). Dans le cas de SIP par exemple, l'établissement et le maintien d'une session de voix sur IP, nécessite que, pour maintenir à jour sa table de Nattage, la passerelle domestique placée en coupure du flux de signalisation SIP force artificiellement, de façon connue, les échanges de signalisation entre le terminal de l'abonné et le réseau public, en imposant une fréquence élevée des requêtes de réenregistrements. En présence d'un double NAT, un tel mécanisme doit aussi être prévu au niveau de l'équipement qui héberge la fonction de NAT Opérateur; et
- une dégradation du service de connectivité IP offert par l'opérateur du réseau public de télécommunications doit être déplorée, notamment parce que des fonctionnalités telles que le "*port forwarding*" ou le *DynDNS* ne peuvent pas être supportées en présence du NAT opérateur.

**Objectifs de l'invention**

Il existe donc un besoin de pallier ces inconvénients de l'art antérieur.

Plus précisément, il existe un besoin de fournir une nouvelle solution pour économiser l'usage d'adresses IP publiques, sans entraîner de dégradation du service rendu au terminal client.

**Exposé de l'invention**

L'invention répond à ce besoin à l'aide d'un procédé de routage d'un paquet de données dans un réseau de télécommunications, ledit paquet comprenant une adresse

primaire de destination et un numéro de port de destination, ledit procédé comprenant, sur réception dudit paquet, les étapes suivantes :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant de routage d'un équipement destinataire du paquet parmi une pluralité d'identifiants de routage d'équipements terminaux associés à ladite adresse de destination à partir du masque de ports déterminé; et
- routage du paquet vers l'équipement terminal destinataire à partir dudit identifiant.

Corrélativement, l'invention concerne un dispositif de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit dispositif est apte à mettre en œuvre, sur réception dudit paquet, les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement terminal destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et
- routage du paquet vers l'équipement terminal destinataire à partir dudit identifiant.

Ainsi, l'invention repose sur une approche tout à fait nouvelle et inventive du routage d'un paquet de données, qui s'appuie sur une combinaison unique constituée de l'adresse de destination du paquet, du masque de ports définissant une plage de numéros de ports qui inclut le numéro de port de destination du paquet reçu et d'un identifiant de routage de l'équipement terminal de destination. L'invention permet donc d'affecter une même adresse primaire et routable dans le réseau de télécommunications, à plusieurs équipements terminaux connectés à ce réseau et donc d'économiser l'usage des adresses IP publiques. L'invention constitue donc une solution simple, efficace et dans la continuité des pratiques courantes dans le domaine à l'épuisement des adresses IPv4. Elle permet à un fournisseur d'augmenter son parc

de clients de manière significative. Elle ne nécessite pas d'investissements conséquents et permet donc une optimisation de CAPEX (Capital Expenditures) et de l'OPEX (Operative Expenditures), L'invention s'applique au routage de paquets de données à destination de tout type d'équipement terminal, qu'il soit connecté ou non à un réseau domestique en particulier et de façon non limitative à une passerelle domestique placée en coupure de flux entre un réseau domestique et un réseau de télécommunications public.

Le procédé de routage selon l'invention est mis en œuvre par un équipement du réseau de télécommunications. Par conséquent, l'invention vise aussi un équipement dans un réseau de télécommunications, apte à recevoir un paquet de données comprenant une adresse de destination et un numéro de port de destination, ledit équipement comprenant un dispositif de routage selon l'invention.

Un tel équipement est donc placé en coupure de tous les flux de données adressés à l'équipement terminal. Il peut s'agir d'un routeur ou d'un équipement dédié du réseau de télécommunications.

De façon avantageuse, l'adresse primaire est une adresse publique. Un avantage de l'utilisation d'un adressage public est d'éviter les traductions d'adresses et les corrections protocolaires à la périphérie d'un domaine administré par un fournisseur de service.

Selon un premier mode de réalisation de l'invention, ledit au moins un identifiant est une adresse secondaire de l'équipement terminal destinataire. Une telle adresse secondaire, aussi appelée adresse privée, n'est pas routable dans tout le réseau de télécommunications. Elle a une portée restreinte, limitée aux échanges de flux entre l'équipement terminal et l'équipement du réseau de télécommunications mettant en œuvre le procédé selon l'invention. Cette adresse n'est pas annoncée au delà du domaine BGP (Border Gateway Protocol) du réseau de télécommunications d'un opérateur donné.

De façon avantageuse, le procédé comprend en outre, préalablement à l'étape de routage, une étape de transformation du paquet pour y ajouter ladite adresse secondaire et le paquet est routé vers l'équipement terminal destinataire à partir de

ladite adresse secondaire.

Selon un aspect du premier mode de réalisation de l'invention, l'étape de transformation consiste en à encapsuler le paquet dans un autre paquet destiné à ladite adresse secondaire.

Un avantage de cette encapsulation est qu'elle ne nécessite pas la modification de la structure interne du paquet. Ainsi, toute opération d'écriture et de calcul d'un nouveau checksum est évitée.

Selon un autre aspect du premier mode de réalisation de l'invention, l'étape de transformation consiste à ajouter l'adresse secondaire de l'équipement destinataire dans un champ du paquet.

Un premier avantage est qu'une telle transformation permet d'optimiser l'utilisation de la bande passante, car elle ne nécessite par l'ajout de deux en-têtes comme le processus d'encapsulation. Un deuxième avantage est qu'elle exploite l'option de routage à la source (source routing ) du protocole IP, par exemple.

Selon un deuxième mode de réalisation de l'invention, l'identifiant est un identifiant de route spécifique à cet équipement terminal et le routage du paquet est effectué à partir dudit identifiant de route spécifique. On entend ici par route spécifique, une route dédiée pour joindre cet équipement et qui ne dessert que cet équipement terminal parmi la pluralité d'équipements possédant la même adresse primaire.

Combinée à l'adresse primaire et au masque de ports affecté à l'équipement terminal de destination, cet identifiant de route spécifique permet d'une part d'identifier de façon unique cet équipement et, d'autre part, de router le paquet de données reçu.

Un avantage est qu'aucune transformation du paquet n'est nécessaire. Ce mode de réalisation de l'invention nécessite une ingénierie du réseau de télécommunications sous-jacent de l'opérateur pour pouvoir installer dans l'équipement qui met en œuvre l'invention des routes disjointes vers des équipements ayant la même adresse primaire.

Dans un mode particulier de réalisation, les différentes étapes du procédé de routage d'un paquet de données sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans un dispositif de routage ou plus généralement dans un ordinateur, ce programme comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de routage tel que décrit ci-dessus.

Ce programme peut utiliser n'importe quel langage de programmation, et être sous la forme de code source, code objet, ou de code intermédiaire entre code source et code objet, tel que dans une forme partiellement compilée, ou dans n'importe quelle autre forme souhaitable.

L'invention vise aussi un support d'informations lisible par un ordinateur, et comportant des instructions d'un programme d'ordinateur tel que mentionné ci-dessus.

Le support d'informations peut être n'importe quelle entité ou dispositif capable de stocker le programme. Par exemple, le support peut comporter un moyen de stockage, tel qu'une ROM, par exemple un CD ROM ou une ROM de circuit microélectronique, ou encore un moyen d'enregistrement magnétique, par exemple une disquette (floppy disc) ou un disque dur.

D'autre part, le support d'informations peut être un support transmissible tel qu'un signal électrique ou optique, qui peut être acheminé via un câble électrique ou optique, par radio ou par d'autres moyens. Le programme selon l'invention peut être en particulier téléchargé sur un réseau de type Internet.

Alternativement, le support d'informations peut être un circuit intégré dans lequel le programme est incorporé, le circuit étant adapté pour exécuter ou pour être utilisé dans l'exécution du procédé en question.

L'invention concerne également un procédé de configuration d'un équipement terminal connecté à un réseau de télécommunications, comprenant, sur réception d'une requête de configuration émise par ledit équipement, les étapes suivantes :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux ; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et

- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

Une pluralité d'équipements terminaux configurés selon l'invention reçoit la même adresse primaire. C'est la combinaison de cette adresse primaire, de l'identifiant de routage et du masque de ports qui permet de les identifier individuellement de façon unique.

Selon un aspect de l'invention, le procédé de configuration comprend une étape d'affectation d'un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal et le message de configuration comprend en outre ledit identifiant de dispositif de routage.

De cette manière, l'équipement terminal connaît l'identité du dispositif de routage des paquets de données qui lui sont destinés.

Selon un aspect de l'invention, ledit message de configuration est envoyé en outre à un équipement du réseau de télécommunications comprenant un dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal

Le procédé de configuration selon l'invention est mis en œuvre par un serveur de configuration dans un réseau de télécommunications, apte, sur réception d'une requête de configuration émise par un équipement terminal, à mettre en œuvre les moyens suivants :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et

-affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est déciée et d'un identifiant de routage; et

- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

L'invention concerne aussi un procédé de mise en œuvre d'une configuration par un équipement terminal connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de

configuration parmi lesquelles une adresse primaire, un masque de port définissant une plage de numéros qui lui est dédiée et un identifiant de routage, ledit procédé comprend les étapes suivantes :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

Selon un aspect de l'invention, le procédé de mise en œuvre d'une configuration comprend en outre une étape d'envoi des données de configuration à un dispositif de routage d'un paquet de données selon l'invention.

Ce dispositif de routage est le dispositif d'attachement de l'équipement terminal. Il voit passer tous les paquets de données destinés à l'équipement terminal.

Selon un autre aspect de l'invention, sur réception d'un paquet de données comprenant une adresse de destination, un numéro de port et un identifiant de routage, ledit procédé comprend en outre une étape de vérification d'une appartenance du numéro de port à la plage de numéros définie par son masque de port et une étape de rejet dudit paquet si la vérification est négative.

Le procédé de mise en œuvre d'une configuration est avantageusement mis en œuvre par un équipement terminal client connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire partagée avec une pluralité d'équipements terminaux, un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage, il est apte à mettre en œuvre les moyens suivants :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse

source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

Dans un mode particulier de réalisation, les différentes étapes du procédé de mise en œuvre d'une configuration sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans une passerelle domestique ou plus généralement dans un ordinateur, ce programme comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de mise en œuvre d'une configuration tel que décrit ci-dessus.

L'invention concerne en outre un procédé de traduction d'adresses d'un paquet de données reçu par une passerelle domestique placée en coupure de flux entre un équipement terminal émetteur dudit paquet et un équipement terminal destinataire dudit paquet dans un réseau de télécommunications, ledit paquet comprenant une première adresse et un premier numéro de port de l'équipement terminal émetteur, ledit procédé étant caractérisé en ce qu'il comprend une étape de remplacement de ladite première adresse et du premier numéro de port par une adresse primaire et un deuxième numéro de port, ledit deuxième numéro de port appartenant à une plage de numéros dédiée à ladite passerelle et déterminée par un masque de numéros de ports.

Lorsqu'un équipement terminal se trouve dans un réseau domestique géré par une passerelle domestique, la passerelle domestique configurée selon l'invention met en œuvre un mécanisme de traduction d'adresses, qui consiste non seulement à remplacer la première adresse de l'équipement terminal par son adresse primaire, mais aussi à sélectionner un numéro de ports dans sa plage dédiée.

Dans un mode particulier de réalisation, les différentes étapes du procédé de traduction d'adresses d'un paquet de données sont déterminées par des instructions de programmes d'ordinateurs.

En conséquence, l'invention vise aussi un programme d'ordinateur sur un support d'informations, ce programme étant susceptible d'être mis en œuvre dans une passerelle domestique ou plus généralement dans un ordinateur, ce programme

comportant des instructions adaptées à la mise en œuvre des étapes d'un procédé de traduction d'adresses tel que décrit ci-dessus.

**Liste des figures**

D'autres avantages et caractéristiques de l'invention apparaîtront plus clairement à la lecture de la description suivante d'un mode de réalisation particulier de l'invention, donné à titre de simple exemple illustratif et non limitatif, et des dessins annexés, parmi lesquels :

- la figure 1, déjà décrite, présente de façon schématique un réseau de télécommunication mettant en œuvre la fonction de NAT opérateur selon l'art antérieur;
- les figures 2A et 2B présentent deux exemples de masques de numéros de port selon l'invention;
- la figure 3 présente de façon schématique une pluralité d'équipements terminaux connectés à un réseau de télécommunications d'un opérateur selon l'invention;
- la figure 4 présente un procédé de routage d'un paquet de données dans un réseau de télécommunications selon l'invention;
- la figure 5 présente un équipement du réseau de télécommunications mettant en œuvre le procédé de routage selon l'invention, dans son environnement;
- la figure 6 présente de façon schématique un mode de réalisation de l'invention, selon lequel l'identifiant de routage est un identifiant de route dédiée à l'équipement terminal destinataire du paquet de données;
- la figure 7 présente de façon schématique le procédé de configuration d'un équipement terminal selon l'invention;
- la figure 8 présente de façon schématique un équipement terminal mettant en œuvre le procédé de mise en œuvre d'une configuration selon l'invention, dans son environnement;
- la figure 9 présente un procédé de mise en œuvre d'une configuration d'un équipement terminal selon l'invention; et
- la figure 10 présente de façon schématique une passerelle domestique mettant

en œuvre le procédé de mise en œuvre d'une configuration selon l'invention, dans son environnement.

**Description d'un mode de réalisation particulier de l'invention**

Le principe général de l'invention repose sur l'affectation d'une même adresse primaire à une pluralité d'équipements terminaux dans un réseau de télécommunications, ces équipements terminaux étant identifiés de façon unique à partir d'un identifiant de routage et d'un masque de port définissant une plage de numéros de ports qui leur est dédiée.

On notera que le terme d'équipement terminal est général et désigne aussi bien un équipement terminal directement connecté au réseau de télécommunications qu'une passerelle domestique.

Les inventeurs ont constaté qu'un équipement terminal n'utilise pas simultanément les $2^{16}$ (i.e. 65536) valeurs de numéros de ports dont il dispose. Cette plage est en effet surdimensionnée pour les besoins réels d'un client, qui n'utilise que quelques connexions pour des applications de type P2P (*Peer to Peer*), FTP (*File Transfer Protocol*), web browsing, téléphonie, etc.

L'invention consiste à réduire la plage de numéros de ports disponibles pour un équipement terminal par application, en affectant à un équipement terminal un masque de ports définissant une sous partie de cette plage. Le masque de port ainsi attribué à un équipement terminal particulier est utilisé, en combinaison avec son adresse IP primaire, pour router les paquets de données qui lui sont destinés. sans dégradation du service IP..

On notera qu'un fournisseur de service de connectivité IP doit respecter la contrainte suivante, à savoir que deux équipements terminaux ayant la même adresse primaire doivent nécessairement recevoir des masques de ports distincts.

Le fournisseur de service de connectivité peut, par exemple, forcer la valeur du bit de poids fort du champ correspondant au numéro de port source des paquets de données IP émis par un équipement terminal donné. Cet équipement dispose alors

d'un masque de ports définissant une plage de 32768 valeurs de numéros de ports possibles.

Le fournisseur peut, selon une variante, forcer la valeur des huit premiers bits de poids fort, de façon à ce que l'équipement terminal dispose d'une plage de 256 numéros de ports utilisables.

Un numéro de port reste donc codé sur un champ de 16 bits, mais avec une partie du champ forcé par le fournisseur de service de connectivité IP. En relation avec les figures 2A et 2B, on présente deux exemples de masques de numéros de ports selon l'invention: un exemple de masque de type contigu et un exemple de type non contigu

- Un masque contigu est un masque qui utilise un ensemble adjacent de bits (représentation binaire du champ port). Cette variante est simple à mettre en œuvre et ne requiert pas d'intelligence de traitement et d'implémentation pour les équipements mettant en œuvre l'invention. La plage associée à un masque contigu est une plage continue et unique. Les valeurs autorisées sont comprises dans un seul intervalle.
- Un masque non contigu est un masque qui utilise des bits non adjacents. La plage de ports résultante peut être définie par l'union de plusieurs « petite » plage continue. L'avantage de cette deuxième variante est la possibilité d'affecter la plage des ports par défaut à plusieurs équipements terminaux en même temps.

On présente, en relation avec la **figure 3,** un réseau de télécommunications RT d'un opérateur sur lequel un fournisseur de service a déployé une architecture de service de connectivité ou d'accès IP. Une pluralité d'équipements terminaux disposent d'un accès à ce réseau. Dans la suite, on désignera par équipement terminal aussi bien les équipements terminaux 110, 120, 130, 140, 160, 170 tels que, par exemple, des téléphones ou des ordinateurs personnels, connectés directement au réseau RT qu'une passerelle domestique 230, 220 placée en coupure de flux entre un réseau domestique et le réseau de télécommunications RT.

Une telle passerelle dispose d'une table de traduction d'adresses ou table de Nattage, qui fait correspondre à une adresse privée et un premier numéro de port d'un équipement terminal de son réseau privé au moins sa propre adresse publique et un deuxième numéro de port.

De façon avantageuse, le réseau de télécommunications RT de l'opérateur comprend au moins un dispositif de routage AN 300 mettant en œuvre le procédé de routage d'un paquet de données selon l'invention. On notera qu'il peut en comprendre plusieurs autres, tels que le dispositif de routage 310.

Ce procédé de routage va maintenant être décrit en relation avec la **figure 4**. Sur réception d'un paquet de données PT comprenant une adresse publique de destination @PUB et un numéro de port de destination P2, le procédé de routage selon l'invention met en œuvre une étape E1 de détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port P2. Les masques de ports affectés aux équipements terminaux du réseau peuvent avantageusement être stockés dans une base de données BD1. En E2, ce masque de ports MP est utilisé pour sélectionner un équipement destinataire du paquet PT parmi une pluralité d'équipements terminaux ayant la même adresse publique P2, et l'identifier à l'aide de son identifiant de routage IDR. Le paquet est ensuite routé en E3 vers l'équipement destinataire sélectionné à partir de son identifiant de routage IDR. Si le dispositif de routage AN 300 ne dispose pas d'entrée dans ses tables de routage, le paquet en question est supprimé.

Dans le mode de réalisation décrit en relation avec la **figure 5**, le dispositif de routage AN 300 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 310, une mémoire vive de type RAM 320, une mémoire morte de type ROM 330 et des moyens 340 de télécommunications avec le réseau 1.

Conformément à l'invention, le dispositif de routage AN 300 comporte une mémoire 350 comprenant une base de données dans laquelle il sauvegarde l'association entre l'adresse publique @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi

bien être externe au dispositif pourvu qu'il puisse y accéder pour récupérer les données d'identification de l'équipement terminal destinataire du paquet de données reçu.

La mémoire morte 330 constitue un support d'enregistrement conforme à l'invention. Ce support mémorise un programme d'ordinateur conforme à l'invention, ce programme comportant des instructions pour l'exécution des étapes du procédé de routage conforme à l'invention qui vient d'être décrit en référence à la **figure 4.**

Le dispositif de routage AN selon l'invention a pour principale fonction de maintenir une table de correspondance entre l'identifiant de routage IDR et le couple (adresse IP publique @PUB, masque de ports MP) de façon à pouvoir déterminer de façon non ambigüe à quel équipement terminal doit être transmis le paquet de données comprenant l'adresse de destination @PUB partagée par plusieurs équipements terminaux. Le dispositif AN peut être localisé dans un PoP (*Point of Presence*) d'accès au réseau de télécommunications RT ou être centralisé. Il peut être hébergé par un routeur ou par un équipement dédié.

L'adresse primaire *@PUB* d'un équipement terminal est annoncée par le dispositif de routage AN, par exemple à l'aide du protocole de routage intra-domaine IGP (Interior Gateway Protocol, en anglais) tels que RIP (Routing Information Protocol), IS-IS ( Intermediate System to Intermediate System) ou OSPF (Open Shortest Path First). Ceci permet de forcer le passage des paquets IP destinés à toute adresse IP publique, affectée comme adresse principale à au moins deux équipements terminaux.

Selon un premier mode de réalisation de l'invention, l'identifiant de routage IDR est une adresse privée ou encore appelé secondaire de l'équipement terminal. Une telle adresse n'est pas annoncée par le dispositif de routage AN. Par conséquent, elle n'est pas routable dans le cœur de réseau RT. Elle n'est pas non plus joignable depuis internet. Dans le cas où le dispositif AN se trouve dans un POP d'accès au réseau RT, sa portée est limitée aux échanges entre l'équipement terminal et les équipements constituants ledit POP.

En relation avec la **figure 6**, on présente maintenant un deuxième mode de réalisation du procédé de routage selon l'invention. Selon ce mode de réalisation,

l'identifiant de routage IDR est un identifiant de route dédiée à l'équipement terminal. Un tel identifiant désigne de façon unique une route qui dessert l'équipement terminal de façon unique et non ambigüe. Ceci est réalisable part exemple à l'aide de routes disjointes. Deux routes R1 et R2 sont dites disjointes si aucun des nœuds constituants la route R1 dans le réseau de l'opérateur n'est traversé au titre de la route R2. Ainsi, les routes R1 et R2 sont constituées par une succession de nœuds, aucun de ces nœuds n'étant partagé entre ces deux routes. Pour ce faire, la topologie du réseau de télécommunications sous jacent doit être construite de telle façon à permettre l'installation de routes disjointes dans la table de routage maintenue par le dispositif de routage AN selon l'invention.

On comprend que, selon l'invention, l'équipement terminal 100 et le dispositif de routage AN 300 doivent être configurés préalablement à toute connexion au réseau.

Le procédé de configuration d'un équipement terminal selon l'invention va maintenant être décrit en relation avec la **figure 7**. Lorsqu'il se connecte au réseau de télécommunications RT de l'opérateur, par exemple suite à sa mise sous tension, l'équipement terminal 100, 200, 210, 220, 130, envoie de façon connue, une requête de configuration au service de connectivité IP du fournisseur de service. Une telle requête RQ-CONF est reçue par un serveur de configuration SC qui lui fournit en retour les données de configuration nécessaires à la mise en œuvre de son service de connectivité IP.

Il peut s'agir, par exemple, d'une requête DHCP_DISCOVER() selon le protocole DHCP diffusée en mode *broadcast* dans le réseau de télécommunications du fournisseur de service IP. Ce message peut être relayé par un client relais DHCP (*DHCP Client Relay*) ou être reçu directement par un serveur de configuration DHCP. Sur réception de ce message, un serveur de configuration DHCP répond à l'émetteur du message DHCP_DISCOVER() par un message dédié DHCP_OFFER() contenant un bail DHCP.

Selon l'invention, le procédé de configuration mis en œuvre par le serveur de configuration SC sur réception de la requête de configuration RQ-CONF. Une étape E"1 consiste à affecter une adresse publique audit équipement terminal, ladite adresse

publique étant partagée avec une pluralité d'équipements terminaux. Une étape E"2 consiste ensuite à affecter audit équipement terminal un masque de ports MP définissant une plage de numéros qui lui est dédiée et un identifiant de routage IDR. De telles données de configuration @PUB, IDR et MP sont enfin envoyées audit équipement terminal dans un message de configuration MESS-CONF..

Selon un aspect de l'invention, le serveur de configuration désigne un dispositif de routage AN 300 d'attachement pour l'équipement terminal. Les données de configuration sont aussi envoyées à ce dispositif de routage AN 300 par le serveur de configuration SC. Dans ce cas, le message de configuration MESS-CONF comprend en outre un identifiant du dispositif de routage d'attachement AN 300.

Lorsque la configuration se fait auprès d'un serveur DHCP, le message de configuration MESS-CONF est une offre de type DHCP_OFFER() qui contient les données de configuration IP relatives à la configuration de l'équipement terminal en ayant fait la demande. De telles données comportent au moins les éléments suivants:

- une adresse secondaire IPV4 @PRIV;
- une adresse primaire IPV4 @PUB ;
- un masque de port MP, qui fait l'objet d'une nouvelle option DHCP selon le format suivant ;

| Code | Len | Val |
|---|---|---|
| TBA | variable | MP |

- *Code* : ce champ renseigne le code de l'option. La valeur de ce champ doit être attribuée par IANA (*Internet Assigned Numbers Authority*). La longueur de ce champ est de 1 octet;
- *Len* : Ce champ renseigne la longueur de la valeur de l'option. Dans le cas de l'option masque de ports, la valeur de ce champ est égale à "variable" ;
- *Val* : Ce champ renseigne la valeur du masque de ports. Cette valeur est codée comme le champ "port" des protocoles de transport IP. La

valeur MP est utilisée pour déterminer la plage des numéros de ports utilisables par une passerelle domestique.

- L'identifiant de dispositif de routage AN d'attachement peut être dans ce cas, un identifiant a.b.c.d égal à son adresse IP ou à son nom de domaine FQDN (*Fully Qualified Domain Name*). Il fait lui aussi l'objet d'une nouvelle option DHCP.

Le format de l'option de dispositif de routage d'attachement (DAN) est le suivant :

| Code | Len | Val |
|---|---|---|
| TBA | 4 | DAN |

- *Code* : ce champ renseigne le code de l'option. La valeur de ce champ doit être attribuée par IANA (*Internet Assigned Numbers Authority*). La longueur de ce champ est de 1 octet;
- *Len* : Ce champ renseigne la longueur de la valeur de l'option. Dans le cas de l'option dispositif de routage d'attachement (DAN), la valeur de ce champ est égale à "4" ;
- *Val* : Ce champ renseigne la valeur du paramètre DAN. Cette valeur est codée sous forme d'une adresse IP.

Les serveurs de configuration DHCP doivent être modifiés pour mettre en œuvre l'invention et notamment affecter ces nouvelles données de configuration à tout équipement terminal, par exemple une passerelle domestique, demandant un accès de connectivité IP.

Dans le mode de réalisation décrit en relation avec la **figure 8**, le serveur de configuration SC 400 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 410, une mémoire vive de type RAM 420, une mémoire morte de type ROM 430 et des moyens 440 de télécommunications avec le réseau 1.

Conformément à l'invention, le serveur de configuration SC 400 comporte une mémoire 450 comprenant une base de données dans laquelle il sauvegarde les données de configuration des équipements terminaux qu'il gère, notamment l'association entre l'adresse primaire @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi bien être externe au serveur de configuration pourvu qu'il puisse y accéder pour récupérer les données de configuration de l'équipement terminal émetteur de la requête de configuration.

En réponse à une requête de configuration envoyée au serveur de configuration SC 400, l'équipement terminal selon l'invention reçoit le message de configuration MESS-CONF comprenant les données de configuration de sa connectivité IP au réseau de télécommunications RT. Sur réception de ce message, il exécute le procédé de mise en œuvre d'une configuration selon l'invention, qui va maintenant être décrit en référence à la **figure 9**. Dans une étape E"1, il enregistre les données de configurations reçues dans une base de données BDT. Lorsqu'il souhaite envoyer un paquet de données PT dans le réseau de télécommunications RT, il sélectionne en E"3 un port P2 dans la plage de numéros de ports définie par le masque de ports PT et affecte au paquet de données PT un port source correspondant au port P2.

Sur réception d'un paquet de données PT' en provenance du réseau de télécommunications, il met en œuvre une étape E"4 de vérification d'une appartenance d'un port P'2 dudit paquet au masque de port MP et rejette le paquet en E"5 si la vérification est négative.

Selon une variante, il comprend en outre une étape E"2 d'envoi des données de configuration à l'équipement AN 300 du réseau de télécommunications RT comprenant le dispositif de routage selon l'invention.

On comprend donc que le dispositif de routage selon l'invention peut être configuré soit par l'intermédiaire de l'équipement terminal, soit directement par le serveur de configuration SC 400.

Le premier cas s'applique, lorsque l'identifiant de routage IDR est une adresse secondaire @PRIV. L'équipement terminal, après avoir activé la nouvelle configuration reçu dans le message de configuration MESS-CONF, qui peut être un bail DHCP, génère un message de configuration, que nous appelons BIND(), destiné au dispositif de routage AN selon l'invention. Ce dispositif est identifié par l'adresse DAN dans le message MESS-CONF. Le message BIND(@PRIV, @PUB, MP) comprend au moins l'adresse principale de l'équipement terminal, son identifiant de routage IDR et son masque de ports. De façon avantageuse, il comprend en outre un identifiant du dispositif de routage apte à router vers l'équipement terminal les paquets de données qui lui sont destinés. Il est émis par l'équipement terminal avec une adresse source égale à @PRIV. Sur réception de ce message, le dispositif de routage AN envoie un acquittement à l'équipement terminal émetteur à l'aide d'un message d'acquittement.

Lorsque l'identifiant de routage IDR est un identifiant de route dédiée à l'équipement terminal, deux variantes pour l'envoi du message BIND() peuvent être envisagées. Dans les deux cas, le serveur de configuration SC connaît l'ensemble des routes maintenues par le dispositif de routage AN :

- Selon la première, le message BIND() est avantageusement transmis au dispositif de routage AN par le serveur de configuration SC. On notera que, dans ce deuxième cas, le serveur de configuration envoie le message BIND() et que ce message comprend l'adresse principale @PUB, le masque de port MP et l'identifiant de la route à utiliser. Sur réception de ce message, le dispositif de routage selon l'invention associe, en consultant sa table de routage avec routes disjoints préinstallées, un identifiant de route spécifique à l'équipement IDR et (@PUB, MP) reçu.
- Selon la deuxième, l'identifiant de la route à utiliser est envoyé par SC au même titre que @PUB et MP. Le terminal envoie un message BIND() contenant les informations suivantes : @PUB, MP et IDR. Néanmoins, noue ne recommandons pas cette deuxième variante car le client ne doit pas être au courant des politiques de routage telles que installées par le fournisseur de service.

En relation avec la **figure 8**, on considère le contenu des messages BIND() envoyés au dispositif de routage AN 300 par les équipements terminaux suivants :

- L'équipement terminal 110 envoie le message BIND(@PUB1, MP1, IDR1);
- La passerelle domestique 220 de l'équipement terminal 120 envoie le message BIND(@PUB2, MP2, IDR2);
- La passerelle domestique 230 de l'équipement terminal 130 envoie le message BIND(@PUB3 MP3, IDR3);
- L'équipement terminal 140 envoie le message BIND(@PUB4, MP4, IDR4).

Une fois le message BIND() reçu par le dispositif de routage AN selon l'invention, ce dernier procède à l'instanciation d'une nouvelle entrée dans une table d'associations (ou de *bindings*). Ladite table permet de déterminer sans ambiguïté parmi l'ensemble de machines gérées par le dispositif de routage AN et ayant la même adresse principale @ PUB, celle vers laquelle il faut transmettre un message destinée à ladite adresse IP donnée (i.e. @PUB) ayant été affectée comme adresse principale.

Pour ce faire, le dispositif de routage AN maintient l'association (IDR, (@PUB, MP)).

Dans le cadre de l'exemple de la **figure 8**, la table des associations contient les associations suivantes :

- IDR1, (@PUB, MP1)
- IDR2, (@PUB, MP2)
- IDR3, (@PUB, MP3)
- IDR4, (@PUB, MP1)

Dans une variante d'implémentation, la signature du message BIND() peut contenir une durée de vie telle que renseignée dans le bail DHCP. De plus, une association installée dans la table des association peut être rafraichie à l'aide d'autres messages BIND(). Si aucune mise à jour n'est reçue avant l'écoulement de la durée de vie, l'entrée correspondante est supprimée de la liste (une marge de précision peut être envisagée).

Dans une autre variante, le message BIND() peut être envoyé par le serveur de configuration 400 SC et non pas par l'équipement terminal qui vient d'être configuré. Les informations requises par l'installation d'une nouvelle entrée dans la table des

associations peuvent être transmises directement par le fournisseur de service au dispositif de routage AN 300 via le serveur de configuration SC 400.

En relation avec la figure 8, on considère l'exemple d'un paquet de données PT (@PUB, P2) émis par l'équipement terminal 110 à destination de l'équipement terminal 120. A la réception de ce paquet destiné à une adresse principale IP @PUB, le dispositif de routage AN procède à la lecture du numéro de port de destination P2 dudit message et déduit le masque de port MP2 correspondant. A l'aide de ce masque et de l'adresse principale @PUB, le dispositif de routage AN détermine, en parcourant sa table des associations, l'identifiant de routage IDR2, par exemple l'adresse secondaire @PRIV2 associée au couple (@PUB, MP2).

Après détermination de l'adresse secondaire, le dispositif de routage AN transforme le paquet IP reçu en un paquet PT'(@PUB, P2, IDR2). Pour des raisons de sécurité, le numéro de port destination à utiliser pour ce paquet PT' est négocié entre l'équipement terminal 120 et le dispositif de routage AN.

On notera que le paquet PT peut être transformé de diverses façons. Selon un premier mode de réalisation, il est encapsulé dans un paquet PT' comprenant, par exemple, comme adresse de destination l'adresse secondaire @PRIV2 de l'équipement terminal destinataire 120.

Selon un deuxième mode de réalisation, le paquet PT est modifié en incluant l'adresse secondaire @PRIV2 dans un champ particulier de son en-tête. Cette transformation du paquet de données permet un mode de routage dit routage à la source. Il n'est pas toujours supporté par les nœuds d'un réseau de télécommunications.

Selon un troisième mode de réalisation, le paquet PT est transformé à l'identique, le routage se faisant à partir de l'identifiant de route dédié IDR2 qui ne nécessite aucune modification du paquet.

Dans le mode de réalisation décrit en relation avec la **figure 8**, l'équipement terminal 100 selon l'invention comporte les éléments matériels que l'on retrouve classiquement dans un ordinateur conventionnel, à savoir un processeur 110, une

mémoire vive de type RAM 120, une mémoire morte de type ROM 130 et des moyens 140 de télécommunications avec le réseau 1.

Conformément à l'invention, l'équipement terminal 100 comporte une mémoire 150 comprenant une base de données dans laquelle il sauvegarde ses données de configuration, notamment l'association entre l'adresse publique @PUB, le masque de ports MP et l'identifiant de routage IDR de l'équipement terminal 100. On notera que cette mémoire peut aussi bien être externe à l'équipement terminal pourvu qu'il puisse y accéder pour récupérer les données de configuration dont il a besoin pour la mise en œuvre de sa connectivité IP sur le réseau de télécommunications RT.

Selon un mode de réalisation de l'invention, décrit en relation avec la **figure 10**, on considère maintenant un équipement terminal 110 connecté au réseau domestique d'une passerelle domestique 210 placée en coupure de flux de données entre l'équipement terminal 110 et le réseau de télécommunications RT. Dans ce mode de réalisation, la passerelle domestique 210 constitue un équipement terminal selon l'invention. De façon connue, elle comprend une table de traduction d'adresses ou table de Nattage NAT qui fait correspondre, pour un flux émis par un équipement terminal 110 de son réseau domestique, une adresse @PRIV1et un port P1 de ce terminal dans le réseau domestique à au moins une adresse publique @PUB2 et un port P2 de la passerelle domestique 210 dans le réseau de télécommunications de l'opérateur RT, P2 appartenant à la plage de numéros définies par le masque de ports MP. Cette table NAT est, par exemple, stockée dans une base de données BDP qui peut être interne ou externe.

Une passerelle domestique selon l'invention met donc en œuvre des moyens de traduction d'adresses sur réception d'un paquet de données PT émis par un équipement terminal de son réseau domestique et adressé au réseau de télécommunications et sur réception d'un paquet de données PT' destiné à cet équipement terminal.

Pour les communications sortantes, la seule différence par rapport aux pratiques existantes est que l'équipement terminal 110 ou la passerelle domestique 120 selon l'invention est obligé de choisir un port source dans la plage fixée par le

masque de port affecté par le fournisseur de service. Tous les messages, sauf les messages BIND(), sont émis avec comme adresse source l'adresse principale ou adresse publique @PUB affectée par le fournisseur de service. Pour les messages BIND(), l'adresse source utilisée est l'adresse secondaire IDR2= @PRIV2.

De façon avantageuse, les paquets de données émis par un équipement terminal donné traversent le dispositif de routage AN 300 auquel cet équipement terminal est attaché. Le dispositif de routage AN procède au marquage des paquets de données IP émis par cet équipement terminal. Le champ DS (Differentiated Services) ou ToS (Type of Service) des paquets IP peut être utilisé pour le marquage, si et seulement si le masque du port ne dépasse pas 6 bits. En effet, lors de la réception du message BIND(), le dispositif de routage AN préinstalle une règle de marquage pour les messages émis par l'équipement terminal en question. Le processus d'encapsulation est alors guidé par la valeur du champ DS des paquets IP reçus et donc le dispositif de routage AN n'a plus besoin d'inspecter les informations relatives à la couche transport. Ainsi le temps de traitement des messages sera amélioré. Cette variante suppose que la machine terminale ne modifie pas le code DS/TOS utilisé et qu'il est repositionné à la même valeur pour les paquets réponses.

Le dispositif de routage conforme à l'invention peut être hébergé par des routeurs traditionnels ou par des équipements dédiés. Etant données que les modifications requises par l'invention lors de la phase de découverte d'un serveur de configuration, par exemple selon le protocole DHCP ne sont pas majeures, les architectures actuelles peuvent être adaptées.

Le dispositif de routage AN selon l'invention peut être hébergé n'importe où dans le réseau de télécommunications de l'opérateur. De façon avantageuse, il est déployé au sein d'un POP d'accès au réseau. De plus, un ou plusieurs dispositifs de routage AN peuvent être déployés au sein du même POP d'accès IP, aussi bien de façon centralisée que distribuée.

## REVENDICATIONS

**1.** Procédé de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit procédé comprend, sur réception dudit paquet, les étapes suivantes :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse de destination à partir du masque de ports; et
- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**2.** Procédé de routage d'un paquet de données IP selon la revendication **1**, caractérisé en ce que ledit au moins un identifiant est une adresse secondaire de destination de l'équipement destinataire.

**3.** Procédé de routage d'un paquet de données IP selon la revendication **2**, caractérisé en ce que le procédé comprend, préalablement à l'étape de routage, une étape de transformation du paquet pour y ajouter ladite adresse secondaire et en ce que le paquet est routé à partir de ladite adresse secondaire.

**4.** Procédé de routage selon la revendication **1**, caractérisé en ce que l'identifiant est un identifiant de route spécifique à cet équipement et en ce que le routage du paquet est effectué à partir dudit identifiant de route spécifique.

**5.** Dispositif de routage d'un paquet de données IP dans un réseau de télécommunications, ledit paquet comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce que ledit dispositif est apte à mettre en œuvre, sur réception dudit paquet, les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et

- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**6.** Equipement dans un réseau de télécommunications, apte à recevoir un paquet de données IP comprenant une adresse primaire de destination et un numéro de port de destination, caractérisé en ce qu'il comprend au moins un dispositif de routage comprenant les moyens suivants :

- détermination d'un masque de ports définissant une plage de numéros de ports à laquelle appartient le numéro de port de destination;
- sélection d'un identifiant d'un équipement destinataire du paquet parmi une pluralité d'identifiants d'équipements associés à ladite adresse primaire de destination à partir du masque de ports; et
- routage du paquet vers l'équipement destinataire à partir dudit identifiant.

**7.** Procédé de configuration d'un équipement terminal connecté à un réseau de télécommunications, caractérisée en ce qu'il comprend, sur réception d'une requête de configuration émise par ledit équipement, les étapes suivantes :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et
- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse primaire, ledit masque de port et ledit identifiant de routage.

**8.** Procédé de configuration d'un équipement terminal selon la revendication **7**, caractérisé en ce qu'il comprend une étape d'affectation audit équipement terminal d'un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal et en ce que le message de configuration comprend en outre ledit identifiant de dispositif de routage.

**9.** Procédé de configuration selon la revendication **7**, caractérisé en ce que ledit message de configuration est envoyé en outre à dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal.

**10.** Serveur de configuration dans un réseau de télécommunications, caractérisé en ce que, sur réception d'une requête de configuration émise par un équipement terminal, il est apte à mettre en œuvre les moyens suivants :

- affectation d'une adresse primaire audit équipement terminal, ladite adresse primaire étant partagée avec une pluralité d'équipements terminaux; et
- affectation audit équipement terminal d'un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage; et
- envoi audit équipement terminal d'un message de configuration comprenant ladite adresse publique, ledit masque de port et ledit identifiant de routage.

**11.** Procédé de mise en œuvre d'une configuration par un équipement terminal connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire, un masque de port définissant une plage de numéros qui lui est dédiée et un identifiant de routage, ledit procédé comprend les étapes suivantes :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

**12.** Procédé de mise en œuvre d'une configuration selon la revendication **11**, caractérisé en ce que, un identifiant de dispositif de routage apte à router un paquet de données comprenant ladite adresse primaire comme adresse de destination vers ledit équipement terminal ayant été reçu, ledit procédé comprend en outre une étape d'envoi des données de configuration audit dispositif de routage.

**13.** Procédé de mise en œuvre d'une configuration selon la revendication **11**, caractérisé en ce que, sur réception d'un paquet de données comprenant une adresse de destination, un numéro de port et un identifiant de routage, ledit procédé comprend en outre une étape de vérification d'une appartenance du numéro de port à la plage de

numéros définie par son masque de port et une étape de rejet dudit paquet si la vérification est négative.

**14.** Equipement terminal client connecté à un réseau de télécommunications, caractérisé en ce que, sur réception d'un message de configuration comprenant des données de configuration parmi lesquelles une adresse primaire partagée avec une pluralité d'équipements terminaux, un masque de ports définissant une plage de numéros qui lui est dédiée et d'un identifiant de routage, il est apte à mettre en œuvre les moyens suivants :

- enregistrement desdites données de configuration;
- préalablement à l'envoi d'un paquet de données dans le réseau de télécommunications, sélection d'un numéro de port dans la plage de numéros de ports définie par le masque de ports, ledit paquet de données comprenant comme adresse source l'adresse primaire dudit équipement terminal et comme numéro de port source le numéro de port sélectionné.

**15.** Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de routage selon la revendication **1**.

**16.** Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de configuration selon la revendication **7**.

**17.** Produit programme d'ordinateur téléchargeable depuis un réseau de communication et/ou stocké sur un support lisible par ordinateur et/ou exécutable par un microprocesseur, caractérisé en ce qu'il comprend des instructions de code de programme pour l'exécution du procédé de mise en œuvre d'une configuration selon la revendication **11**.

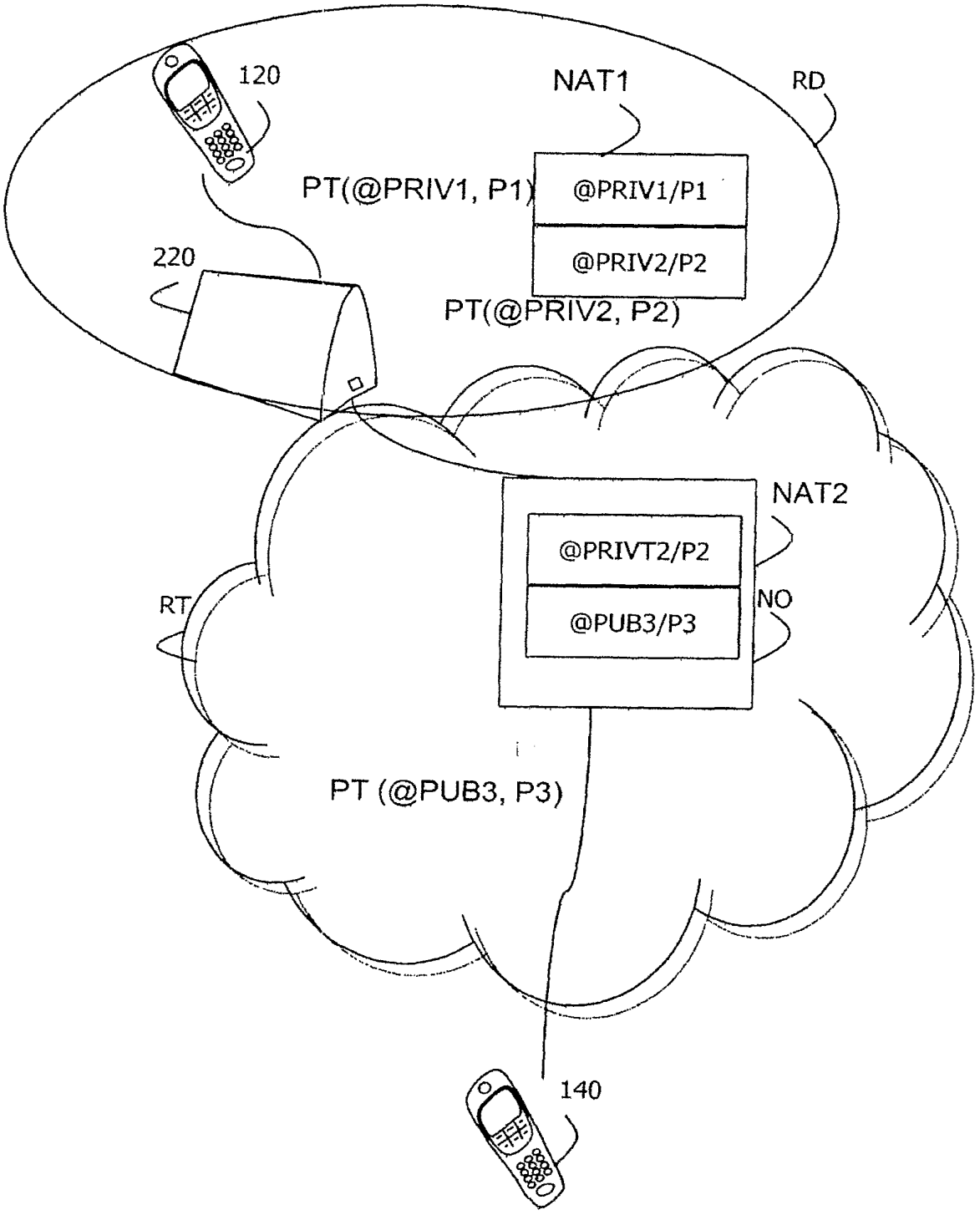

120
NAT1
RD
PT(@PRIV1, P1)
@PRIV1/P1
@PRIV2/P2
220
PT(@PRIV2, P2)
NAT2
@PRIVT2/P2
@PUB3/P3
RT
NO
PT (@PUB3, P3)
140

FIG. 1

MC

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | x | x | x | x | x | x | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | x | x | x | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x |
| x | x | x | x | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| x | x | x | x | x | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

FIG. 2A

MC

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | x | x | x | x | x | 1 | x | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | x | x | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | x | x | 1 | 1 | 1 | 1 | 1 | 1 | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | x | x | 1 | 1 | 1 | x | x | x | x | x | x |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | x | x | 1 | x | x |
| 1 | 1 | 1 | 1 | x | x | x | 1 | x | 1 | x | 1 | 1 | 1 | 1 | x |
| x | x | x | x | 1 | x | 1 | x | 1 | x | 1 | x | 1 | x | 1 | 1 |
| x | x | x | x | x | 1 | 1 | x | 1 | x | 1 | 1 | 1 | x | x | x |

FIG. 2B

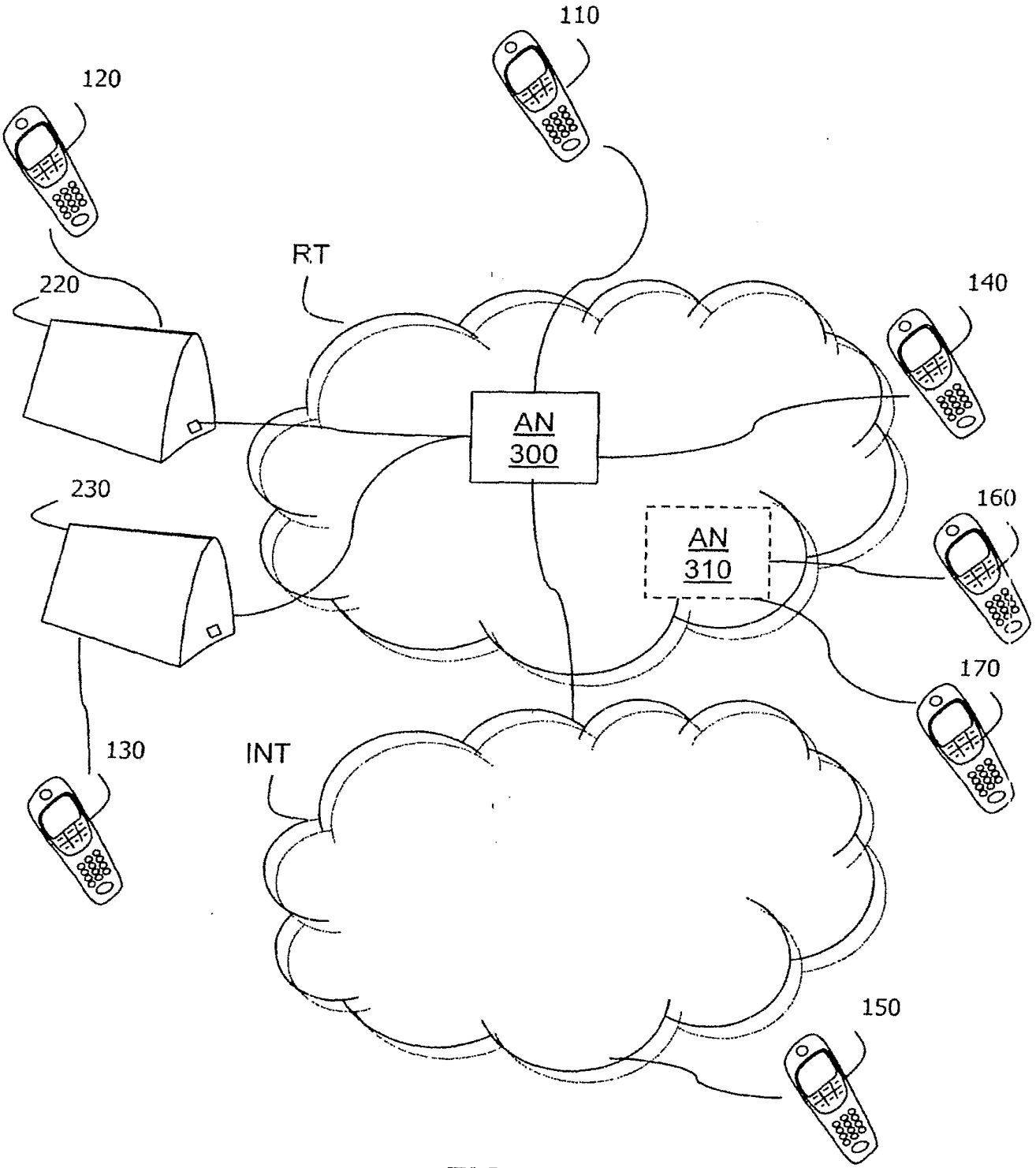



FIG. 3

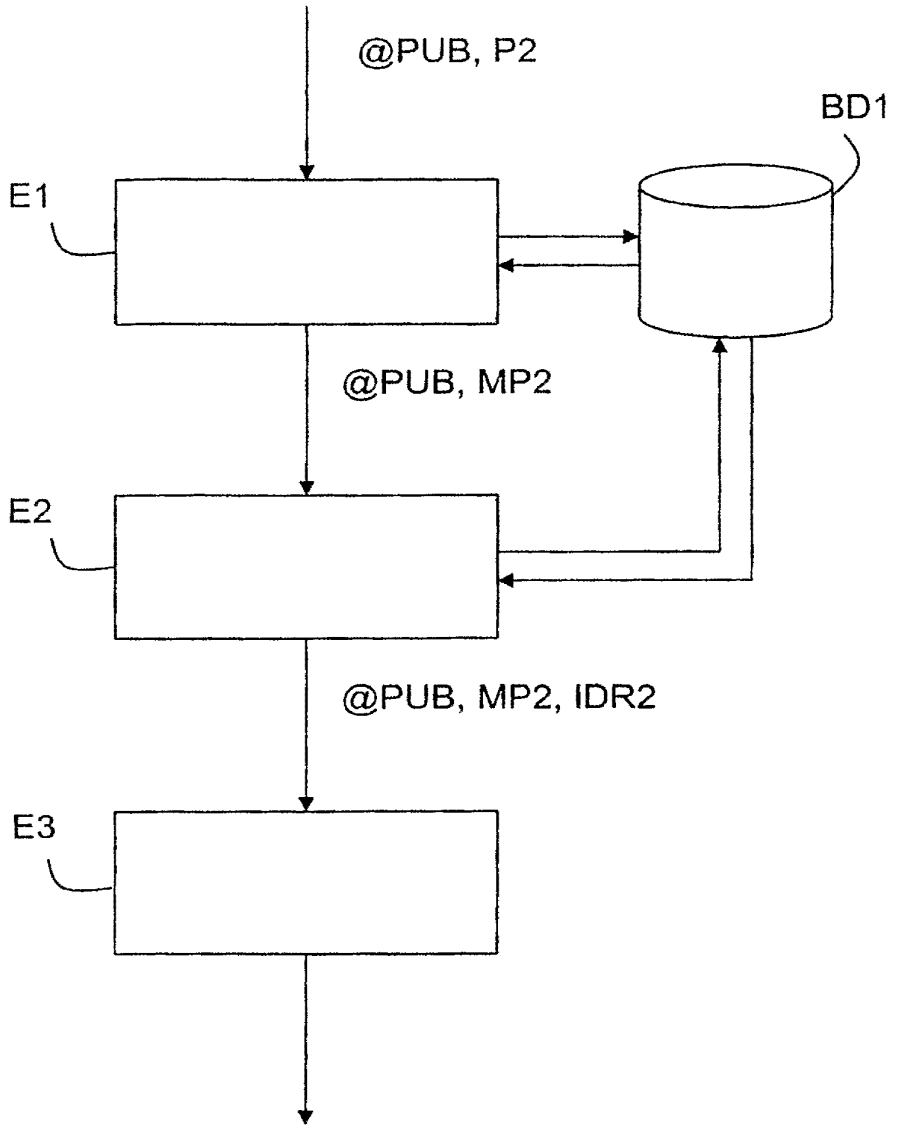



FIG. 4

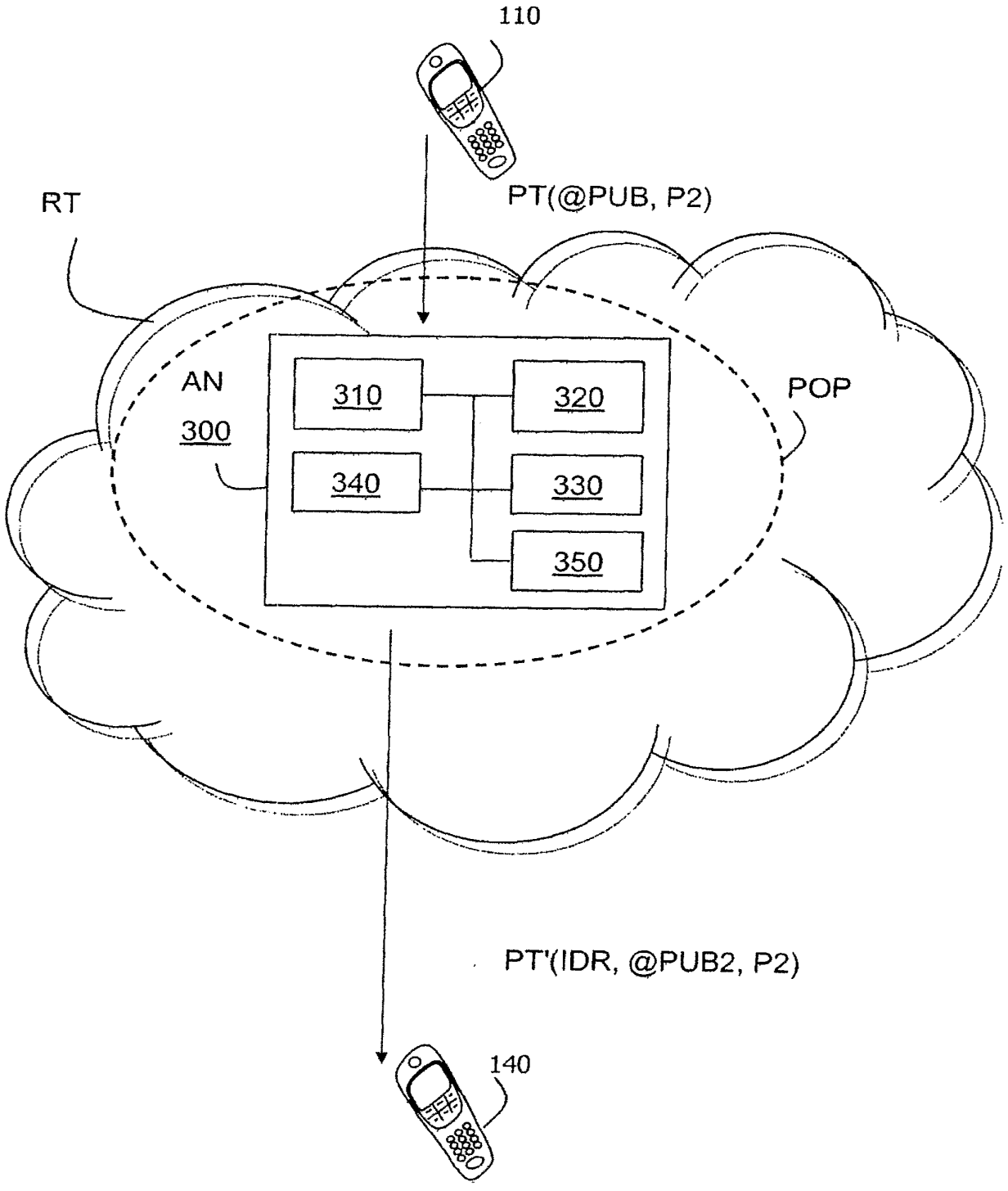



FIG. 5

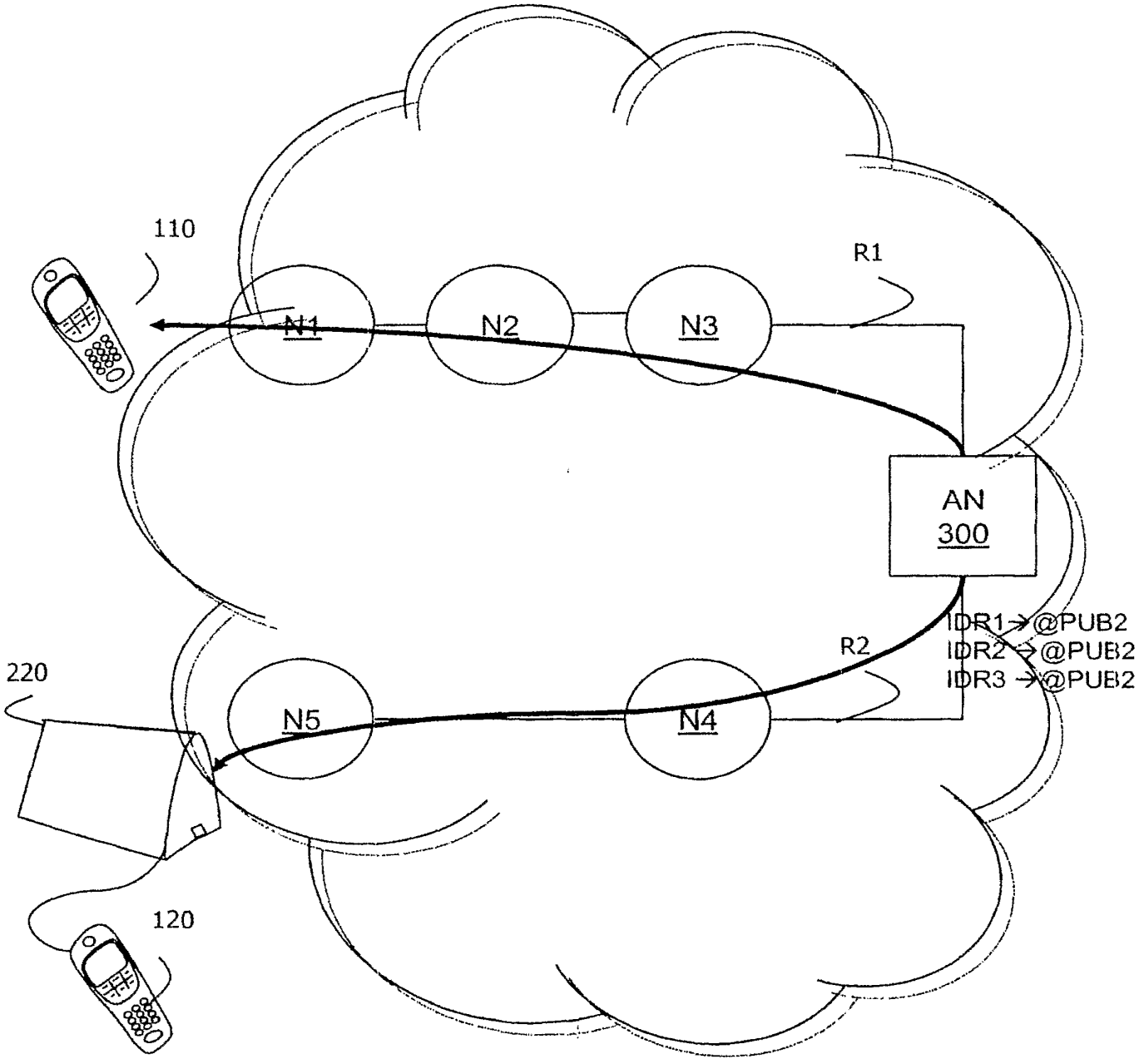

110
R1
N1
N2
N3
AN
300
IDR1→@PUB2
IDR2→@PUB2
IDR3→@PUB2
R2
220
N5
N4
120

FIG. 6

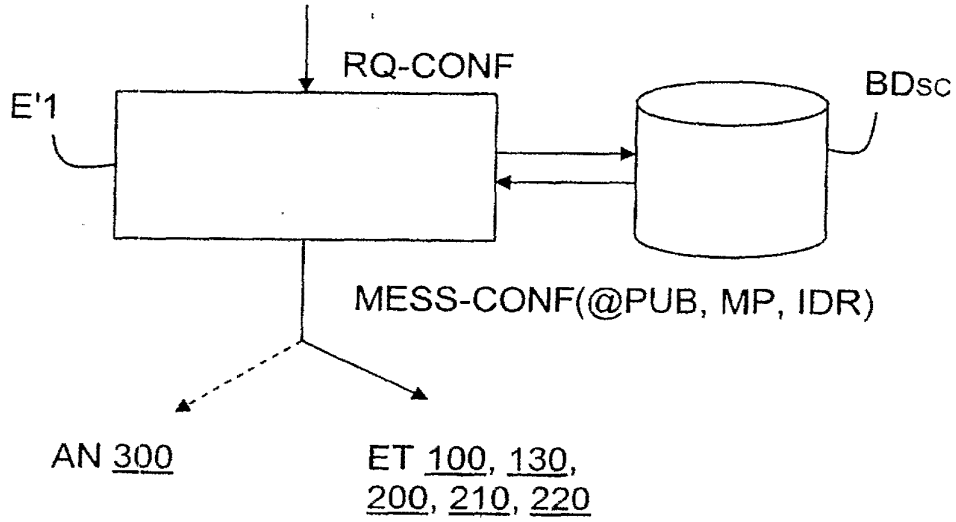

RQ-CONF
E'1
BDsc
MESS-CONF(@PUB, MP, IDR)
AN 300
ET 100, 130,
200, 210, 220

FIG. 7

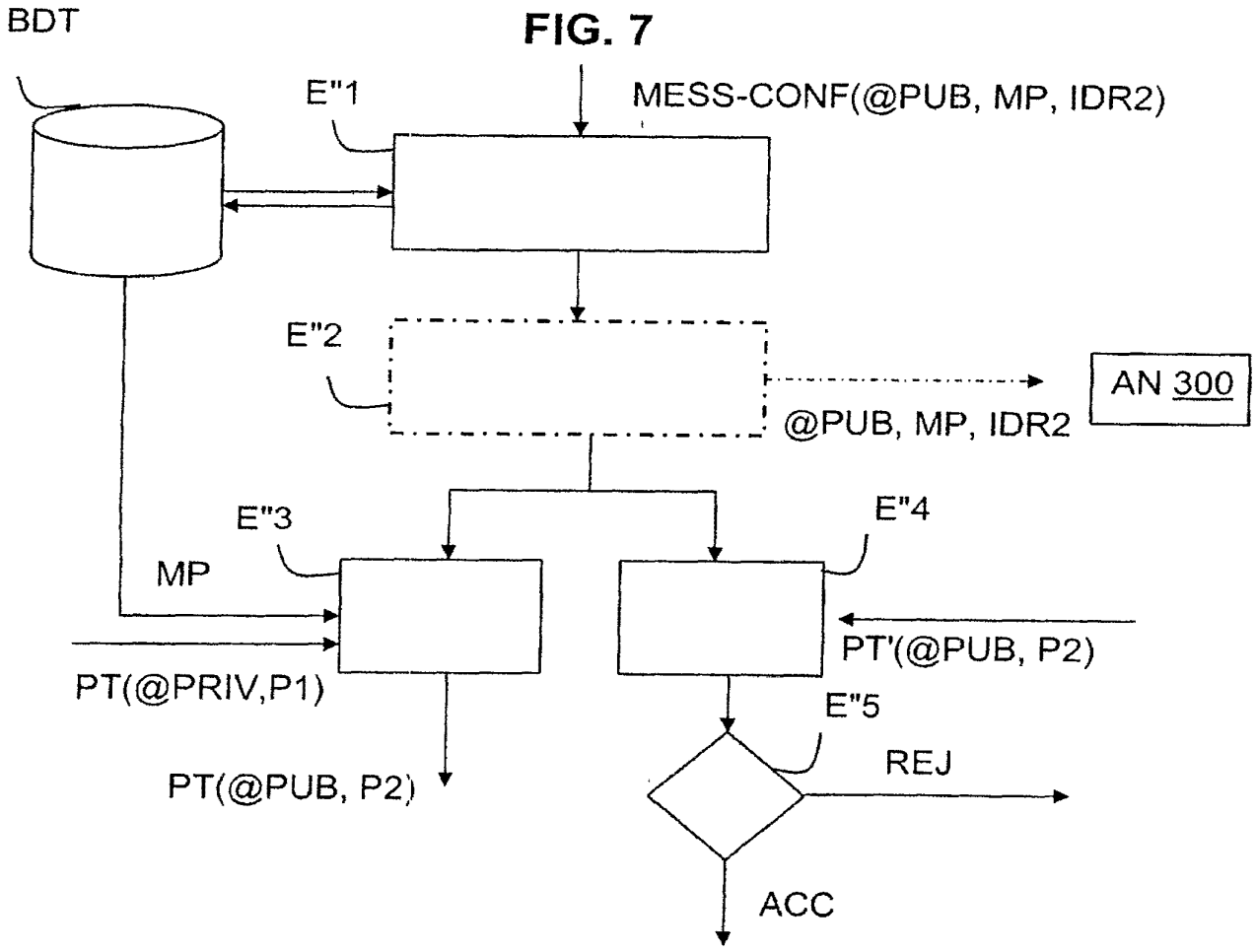

BDT
E"1
MESS-CONF(@PUB, MP, IDR2)
E"2
AN 300
@PUB, MP, IDR2
E"3
E"4
MP
PT'(@PUB, P2)
PT(@PRIV,P1)
E"5
REJ
PT(@PUB, P2)
ACC

FIG. 9

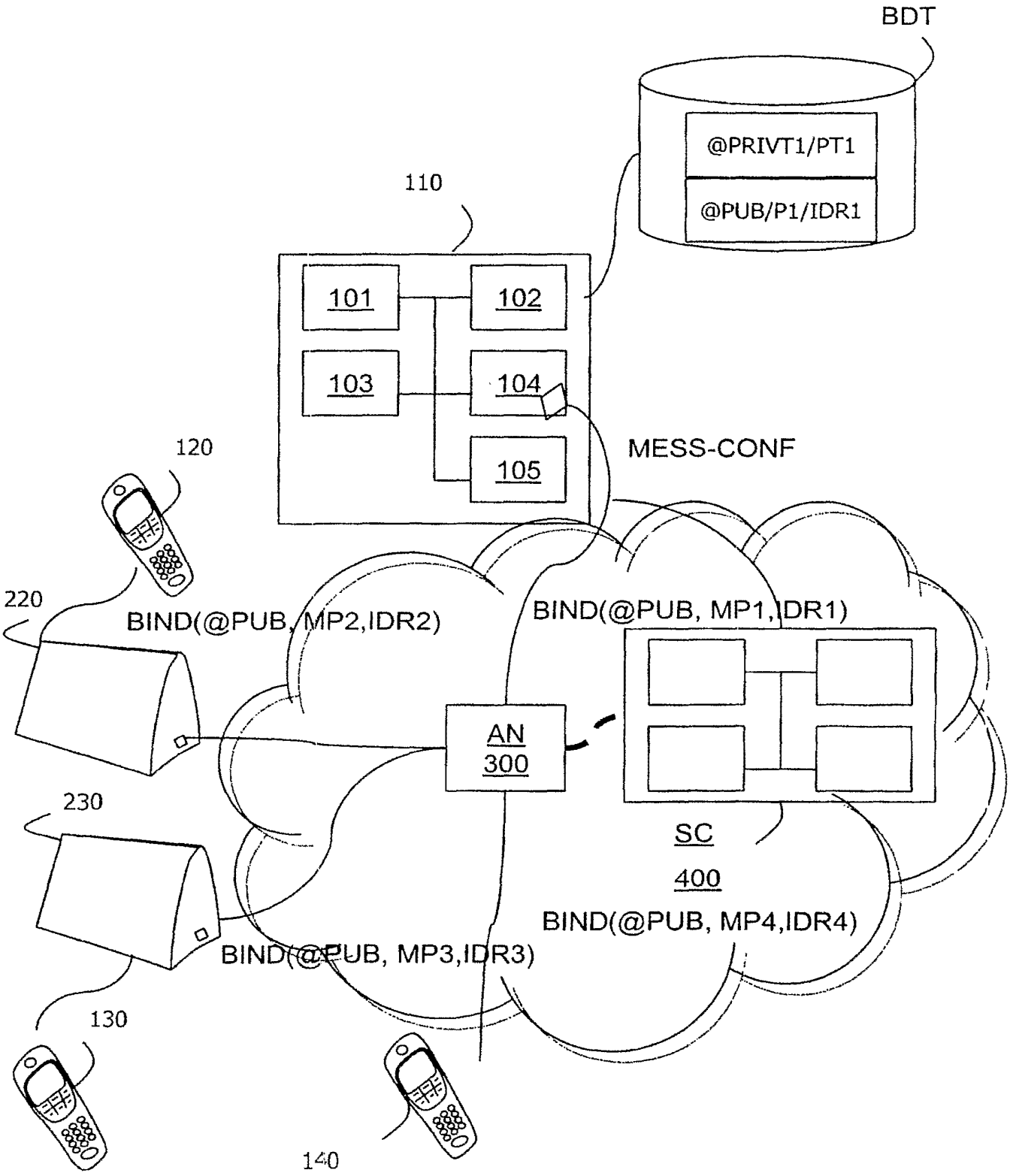

BDT
@PRIVT1/PT1
@PUB/P1/IDR1
110
101
102
103
104
105
MESS-CONF
120
220
BIND(@PUB, MP2,IDR2)
BIND(@PUB, MP1,IDR1)
AN
300
SC
400
230
BIND(@PUB, MP4,IDR4)
BIND(@PUB, MP3,IDR3)
130
140

FIG. 8

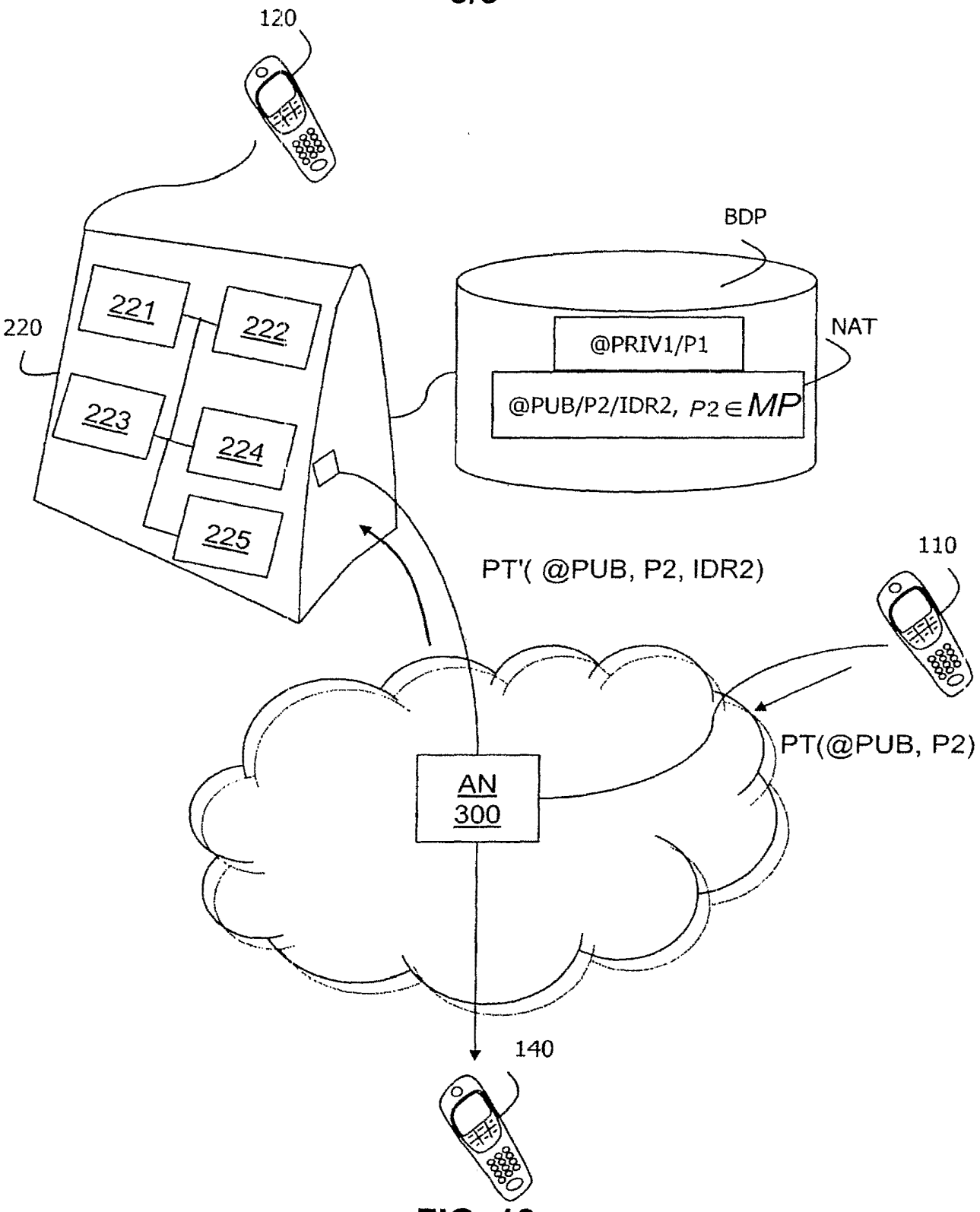

120
BDP
220
221
222
223
224
225
@PRIV1/P1
@PUB/P2/IDR2, P2 ∈ MP
NAT
PT'( @PUB, P2, IDR2)
110
PT(@PUB, P2)
AN
300
140

FIG. 10

INPI
DE LA PROPRIÉTÉ
INDUSTRIELLE

**BREVET D'INVENTION**
**CERTIFICAT D'UTILITE**

certifié
N° 12236 01

# Désignation de l'inventeur

| | |
|---|---|
| **Vos références pour ce dossier** | 06949 |
| **N°D'ENREGISTREMENT NATIONAL** | |
| **TITRE DE L'INVENTION** | |
| | PROCEDE DE ROUTAGE D'UN PAQUET DE DONNEES DANS UN RESEAU ET DISPOSITIF ASSOCIE |
| **LE(S) DEMANDEUR(S) OU LE(S) MANDATAIRE(S):** | |
| DESIGNE(NT) EN TANT QU'INVENTEUR(S): | |
| Inventeur 1 | |
| Nom | BOUCADAIR |
| Prénoms | Mohamed |
| Rue | 124, rue Saint Jean |
| Code postal et ville | 14000 CAEN |
| Société d'appartenance | FRANCE TELECOM |

La loi n°78-17 du 6 janvier 1978 relative à l'informatique aux fichiers et aux libertés s'applique aux réponses faites à ce formulaire.
Elle garantit un droit d'accès et de rectification pour les données vous concernant auprès de l'INPI.

Signé par
Signataire: FR, FRANCE TELECOM RD. Myriam PLAT
Emetteur du certificat: FR, INPI, INPI-EN-LIGNE 1.0
Fonction
(Demandeur)

| | | |
|---|---|---|
| VIII-4-1 | **Déclaration : Qualité d'inventeur (seulement aux fins de la désignation des États-Unis d'Amérique)**<br>Déclaration relative à la qualité d'inventeur (règles 4.17.iv) et 51bis.1.a)iv)) aux fins de la désignation des États-Unis d'Amérique : | Par la présente, je declare que je crois être le premier inventeur original et unique (si un seul inventeur est mentionné ci-dessous) ou l'un des premiers coïnventeurs (si plusieurs inventeurs sont mentionnés ci-dessous) de l'objet revendiqué pour lequel un brevet est demandé.<br>La présente déclaration a trait à la demande internationale PCT/FR2009/050548 (si la déclaration est remise en vertu de la règle 26ter)<br>Par la présente, je déclare que mon domicile, mon adresse postale et ma nationalité sont tels qu'indiqués près de mon nom.<br>Par la présente, je déclare avoir passé en revue et comprendre le contenu de la demande internationale à laquelle il est fait référence ci-dessus, y compris les revendications de ladite demande. J'ai indiqué dans la requête de ladite demande, conformément à la règle 4.10 du PCT, toute revendication de priorité d'une demande étrangère et j'ai identifié ci-dessous, sous l'intitulé "Demandes antérieures", au moyen du numéro de demande, du pays ou du membre de l'Organisation mondiale du commerce, du jour, du mois et de l'année du dépôt, toute demande de brevet ou de certificat d'auteur d'invention déposée dans un pays autre que les États-Unis d'Amérique, y compris toute demande internationale selon le PCT désignant au moins un pays autre que les États-Unis d'Amérique, dont la date de dépôt est antérieure à celle de la demande étrangère dont la priorité est revendiquée. |
| VIII-4-1-1 | Demandes antérieures : | |

| | | |
|---|---|---|
| | | Par la présente, je reconnais l'obligation qui m'est faite de divulguer les renseignements dont j'ai connaissance et qui sont pertinents quant à la brevetabilité de l'invention, tels qu'ils sont définis dans le Titre 37, § 1.56, du Code fédéral des réglementations, y compris, en ce qui concerne les demandes de continuation-in-part les renseignements pertinents qui sont devenus accessibles entre la date de dépôt de la demande antérieure et la date du dépôt international de la demande de continuation-in-part.<br>Je déclare par la présente que toute déclaration ci-incluse est, à ma connaissance, véridique et que toute déclaration formulée à partir de renseignements ou de suppositions est tenue pour véridique; et de plus, que toutes ces déclarations ont été formulées en sachant que toute fausse déclaration volontaire ou son équivalent est passible d'une amende ou d'une incarcération, ou des deux, en vertu de la Section 1001 du Titre 18 du Code des États-Unis, et que de telles déclarations volontairement fausses risquent de compromettre la validité de la demande de brevet ou du brevet délivré à partir de celle-ci. |
| VIII-4-1-1-1 | Nom (NOM DE FAMILLE, prénom) : | BOUCADAIR, Mohamed |
| VIII-4-1-1-2 | Domicile :<br>(ville et État (des États-Unis d'Amérique), le cas échéant, ou pays) | CAEN, France |
| VIII-4-1-1-3 | Adresse postale : | 124, rue Saint Jean 14000 CAEN France |
| VIII-4-1-1-4 | Nationalité : | FR |
| VIII-4-1-1-5 | Signature de l'inventeur :<br>(La signature doit être celle de l'inventeur, il ne peut s'agir de celle du mandataire) | |
| VIII-4-1-1-6 | Date : | 14-04-09 |

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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# PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

| Application or Docket Number | Filing Date | ☐ To be Mailed |
|---|---|---|
| 12/935,040 | 09/28/2010 | |

## APPLICATION AS FILED – PART I

| FOR | (Column 1) NUMBER FILED | (Column 2) NUMBER EXTRA | SMALL ENTITY RATE ($) | SMALL ENTITY FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY FEE ($) |
|---|---|---|---|---|---|---|---|
| ☒ BASIC FEE (37 CFR 1.16(a), (b), or (c)) | N/A | N/A | N/A | | | N/A | 330 |
| ☒ SEARCH FEE (37 CFR 1.16(k), (i), or (m)) | N/A | N/A | N/A | | | N/A | 430 |
| ☒ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q)) | N/A | N/A | N/A | | | N/A | 220 |
| TOTAL CLAIMS (37 CFR 1.16(i)) | 17 minus 20 = | * 0 | X $ = | | OR | X $52 = | 0 |
| INDEPENDENT CLAIMS (37 CFR 1.16(h)) | 7 minus 3 = | * 4 | X $ = | | | X $220 = | 880 |
| ☐ APPLICATION SIZE FEE (37 CFR 1.16(s)) | If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s). | | | | | | |
| ☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j)) | | | | | | | |
| * If the difference in column 1 is less than zero, enter "0" in column 2. | | | TOTAL | | | TOTAL | 1860 |

## APPLICATION AS AMENDED – PART II

| AMENDMENT 09/28/2010 | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | SMALL ENTITY RATE ($) | SMALL ENTITY ADDITIONAL FEE ($) | OR | OTHER THAN SMALL ENTITY RATE ($) | OTHER THAN SMALL ENTITY ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * 17 | Minus | ** 20 | = 0 | X $ = | | OR | X $52= | 0 |
| Independent (37 CFR 1.16(h)) | * 7 | Minus | ***7 | = 0 | X $ = | | OR | X $220= | 0 |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | 0 |

| AMENDMENT | (Column 1) CLAIMS REMAINING AFTER AMENDMENT | | (Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR | (Column 3) PRESENT EXTRA | RATE ($) | ADDITIONAL FEE ($) | | RATE ($) | ADDITIONAL FEE ($) |
|---|---|---|---|---|---|---|---|---|---|
| Total (37 CFR 1.16(i)) | * | Minus | ** | = | X $ = | | OR | X $ = | |
| Independent (37 CFR 1.16(h)) | * | Minus | *** | = | X $ = | | OR | X $ = | |
| ☐ Application Size Fee (37 CFR 1.16(s)) | | | | | | | | | |
| ☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j)) | | | | | | | OR | | |
| | | | | | TOTAL ADD'L FEE | | OR | TOTAL ADD'L FEE | |

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/STEPHEN HOOVER/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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